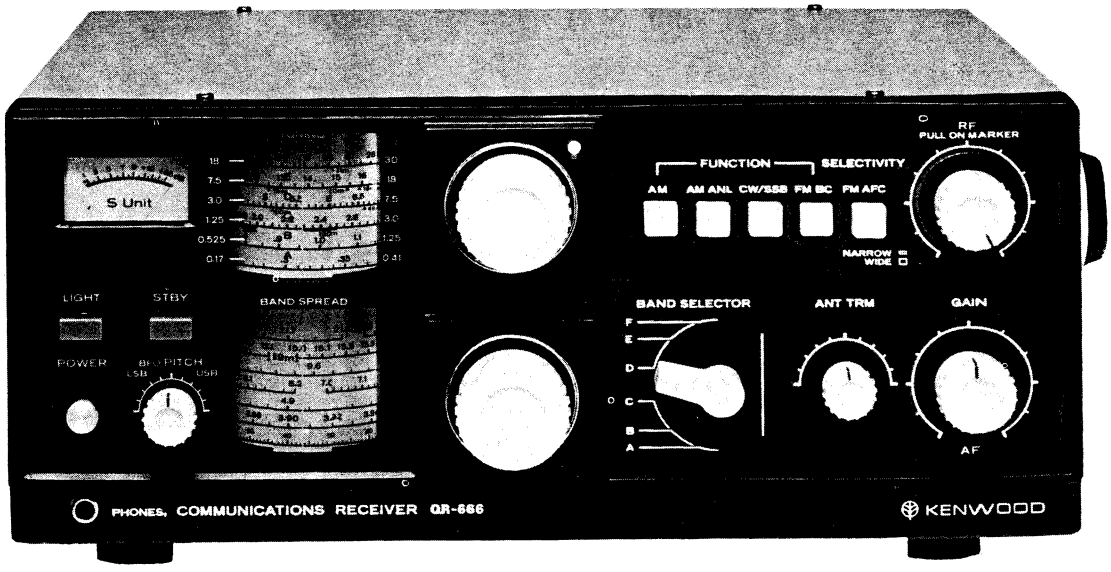
KENWOOD

SERVICE MANUAL

Model QR-666



COMMUNICATIONS RECEIVER

CONTENTS

SPECIFICATIONS

1. Frequency range

Band	A	170 ~ 410 KHz
	B	525 ~ 1250 KHz
	C	1.25 ~ 3.0 MHz
	D	3.0 ~ 7.5 MHz
	E	7.5 ~ 18 MHz
	F	18 ~ 30 MHz
FM · BC		87.5 ~ 108 MHz (option)

2. Band spread

Ham bands

80 and 75 m	3.5 ~ 4.0 MHz
40 m	7 ~ 7.5 MHz
20 m	14 ~ 14.6 MHz
15 m	21 ~ 21.5 MHz
10 m	28 ~ 30 MHz

Shortwave bands

75 m	3.82 ~ 4.0 MHz
60 m	4.75 ~ 5.1 MHz
49 m	5.9 ~ 6.2 MHz
41 m	7.0 ~ 7.5 MHz
31 m	9.4 ~ 9.8 MHz
25 m	11.7 ~ 12.0 MHz
19 m	15.0 ~ 15.5 MHz
16 m	17.6 ~ 18.0 MHz
13 m	21.4 ~ 21.8 MHz
11 m	25.6 ~ 26.2 MHz

3. Receivable radio waves

AM, SSB, CW, FM (option)

4. Intermediate frequencies

Band A ~ E		455 KHz
Band F (Doble Conversion)	1st IF	4.034 MHz
	2nd IF	455 KHz
FM · BC (option)		10.7 MHz

5. Sensitivity

AM. . . Sensitivity for AM S/N ratio of 10dB at 50mw output/8Ω

		AM	SSB/CW
Band A	190 KHz	4.0 μV	3.0 μV
	280 KHz	3.0 μV	2.0 μV
	380 KHz	2.0 μV	1.6 μV
Band B	600 KHz	3.0 μV	2.0 μV
	900 KHz	1.6 μV	1.0 μV
	1200 KHz	1.6 μV	1.0 μV
Band C	1.3 MHz	3.0μV	2.0 μV
	2.0 MHz	1.6 μV	1.0 μV
	2.8 MHz	1.6 μV	1.0 μV
Band D	3.4 MHz	3.0 μV	2.0 μV
	5.0 MHz	2.0 μV	1.4 μV
	7.0 MHz	2.0 μV	1.4 μV
Band E	8.0 MHz	5.0 μV	3.0 μV
	12.0 MHz	3.0 μV	2.0 μV
	17.0 MHz	3.0 μV	2.0 μV
Band F	19.0 MHz	5.0 μV	3.0 μV
	24.0 MHz	3.0 μV	2.0 μV
	29.0 MHz	2.0 μV	1.6 μV

FM. . . Deviation : 22.5 KHz/1 KHz
S/N ratio : 20 dB at 50 mw output/8Ω

(option)	90.0 MHz	3.0 μV
	98.0 MHz	3.0 μV
	106.0 MHz	3.0 μV

6. Image ratio

Band A	280 KHz	More than 65dB
Band B	900 KHz	More than 55dB
Band C	2.0 MHz	More than 55dB
Band D	5.0 MHz	More than 40dB
Band E	12.0 MHz	More than 25dB
Band F	24.0 MHz	More than 40dB
FM (option)	98.0 MHz	More than 60dB

7. IF Image ratio

Band A	280 KHz	More than 40dB
Band B	900 KHz	More than 50dB
Band C	2.0 MHz	More than 70dB
Band D	5.0 MHz	More than 70dB
Band E	12.0 MHz	More than 70dB
Band F	24.0 MHz	More than 50dB
FM · BC	98.0 MHz	More than 70dB

8. Selectivity (IF band width)

	−6dB	−50dB	−60dB
AM WIDE	Over 5 KHz	Below 10 KHz	—
AM NARROW	Over 2.5 KHz		Below 10 KHz
FM	Over 160 KHz	Below 750 KHz	—

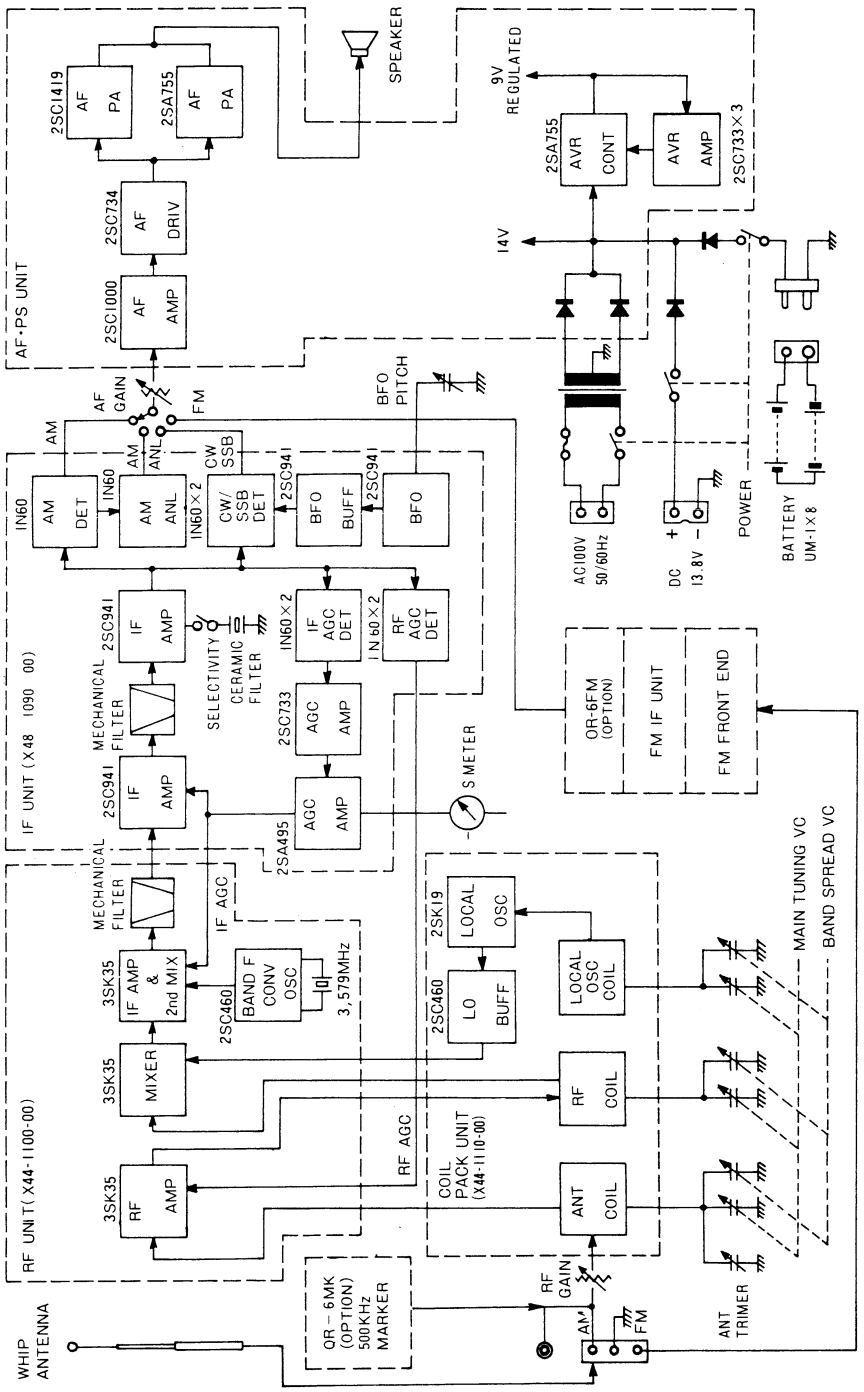
9. **Frequency stability**
   (1 to 60 minutes after switch-on at normal temperature)

Band A	280 KHz	Less than 1 KHz
Band B	900 KHz	Less than 2 KHz
Band C	2.0 MHz	Less than 10 KHz
Band D	5.0 MHz	Less than 15 KHz
Band E	12.0 MHz	Less than 20 KHz
Band F	24.0 MHz	Less than 25 KHz
FM · BC	98.0 MHz	Less than 80 KHz

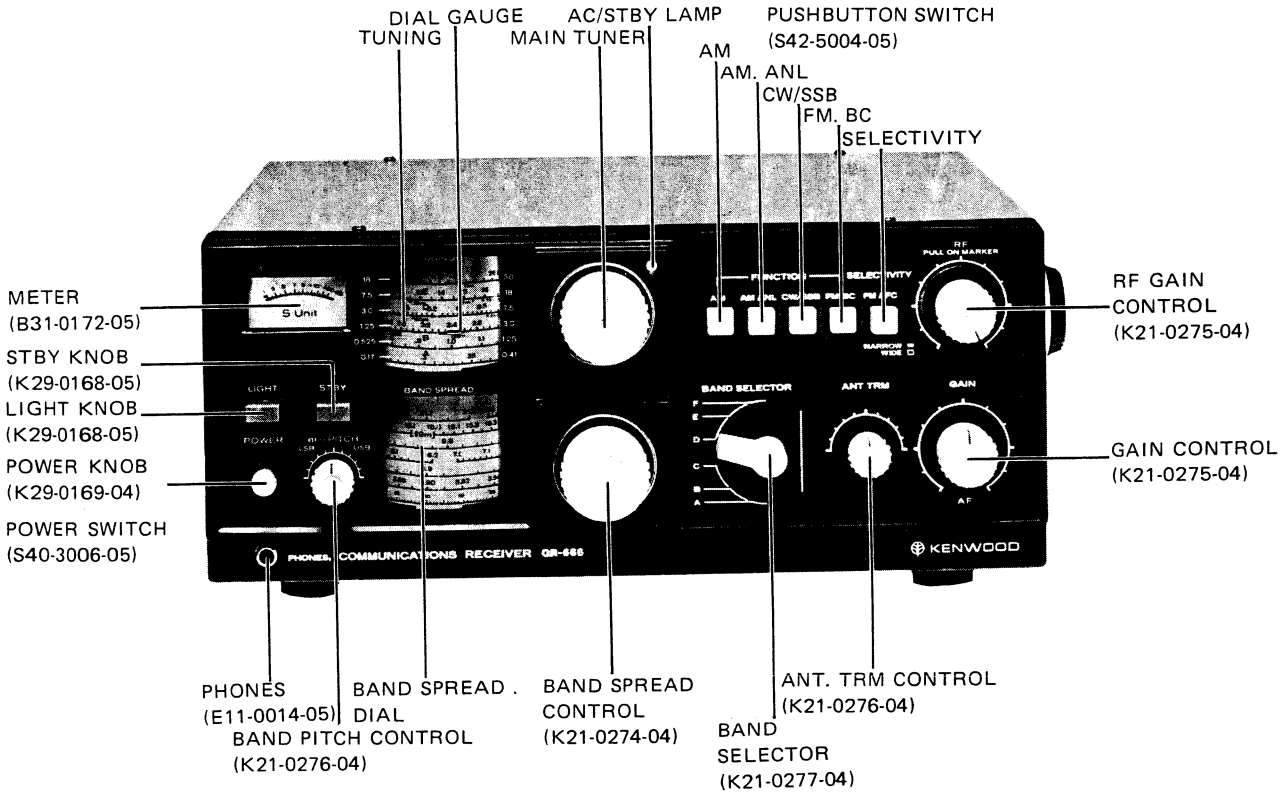
10. **BFO variable range**
    More than ± 3 KHz at 455 KHz
11. **Audio frequency output**
    Over 1.5 W/8Ω (with 10% distortion/1 KHz)
12. **Power supply and consumption**
    (with AF output at 1.5 W/8Ω)
    AC 100/117/220/240 V Below 15 W
    DC 12 V from bateries (UM-1 x 8) Below 13 W
    DC 13 V from external power source
    (allowed variable range: 12 to 15 V)
    Below 13 W
13. **Transistors and diodes used**
    4 FETs, 16 transistors and 24 diodes
14. **Outer dimensions**
    362(W) x 163(H) x 322(D)
    380(W) x 163(H) x 322(D) (with FM option)
15. **Weight**
    7.3 kg. (main unit only)
16. **Accessories**
    Rod Antenna Remote Plug
    Instruction manual
    AC Line Cord
    DC Line Cord

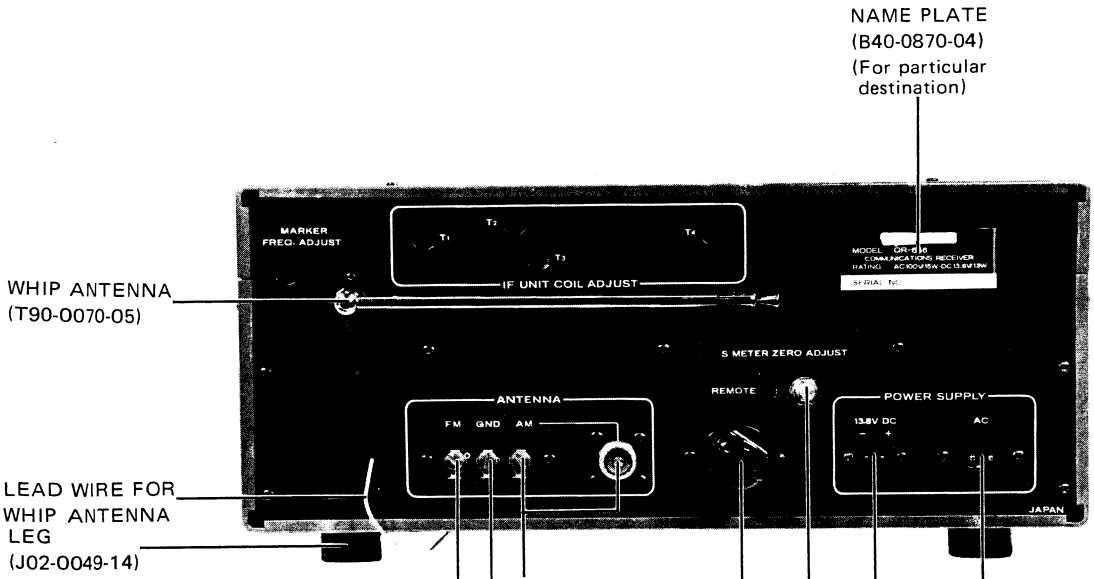
* Any of the specifications given here may be changed or modified without notice.

BLOCK DIAGRAM

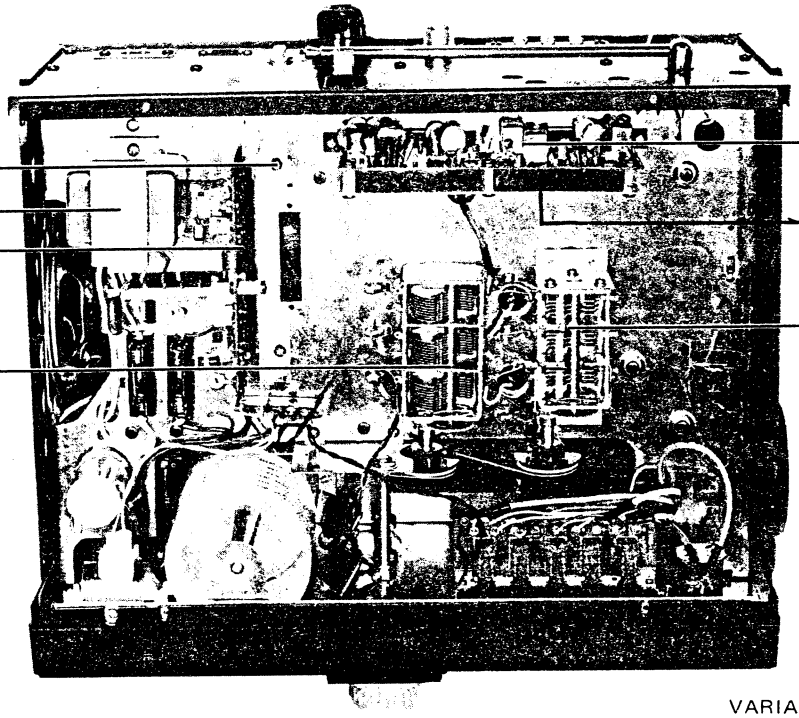


EXTERNAL VIEW





CHASSIS TOP VIEW



AF SHIELD PLATE (F10-0326-04)

POWER TRANS. (L09-0001-15)

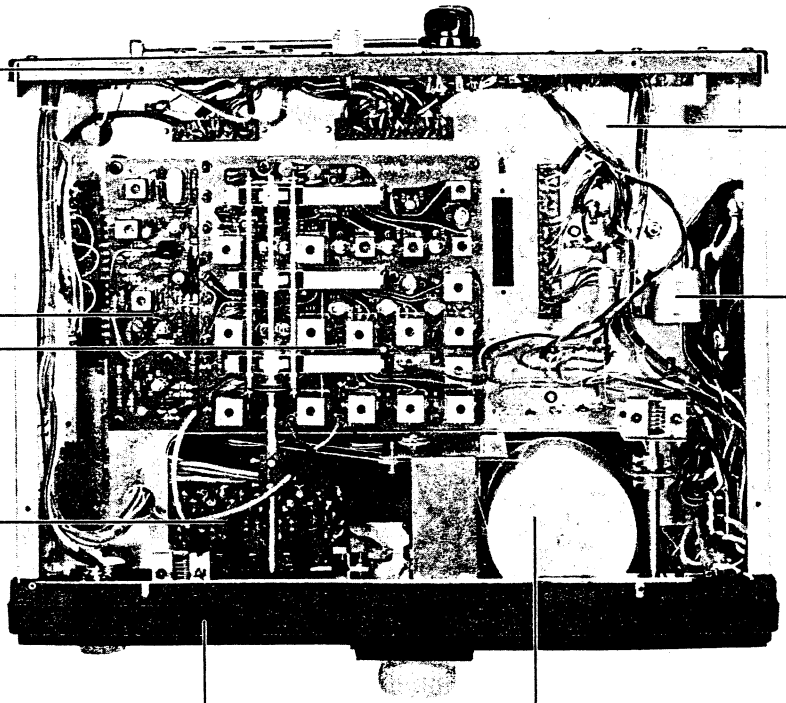
PRINTED CIRCUIT BOARD OF AF/PS (J25-0987-04)

VARIABLE CAPACITOR (Band spread) (C01-0180-05)

IF UNIT (X48-1090-00)

IF SHIELD PLATE (F10-0325-04)

VARIABLE CAPACITOR (Main) (C01-0179-05)



REAR PANEL (A23-0439-02)

RF UNIT (X44-1100-00)

COIL PACK (X44-1110-00)

PRINTED-CIRCUIT BOARD OF SWITCH UNIT (J25-0986-04)

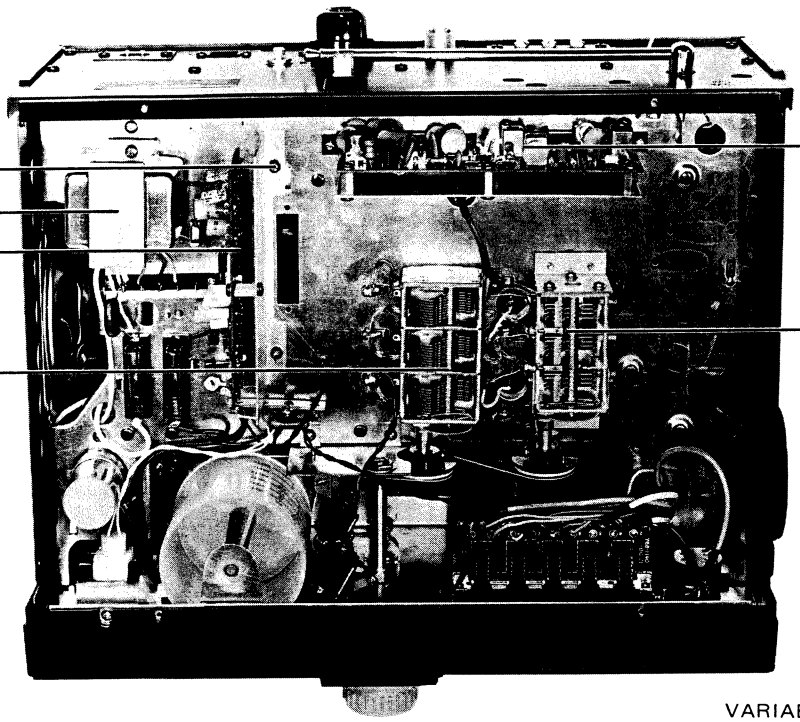
CHASSIS (A10-0372-01)

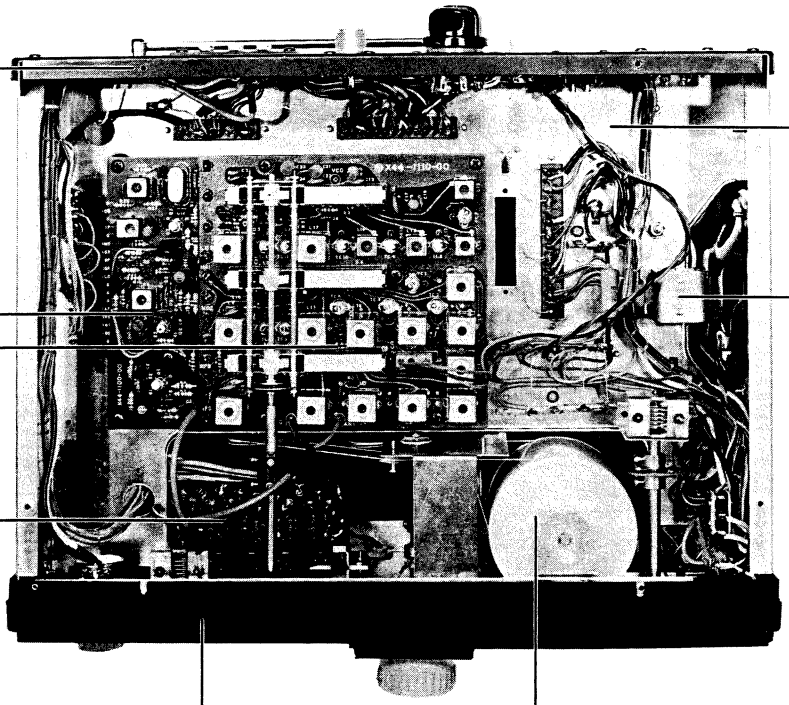
SPEAKER (T05-0006-05)

FRONT PANEL (A20-0712-03)

DIAL DRUM (A) (D09-0007-04)
DIAL DRUM (B) (D09-0008-04)
DIAL DRUM (C) (D09-0009-04)

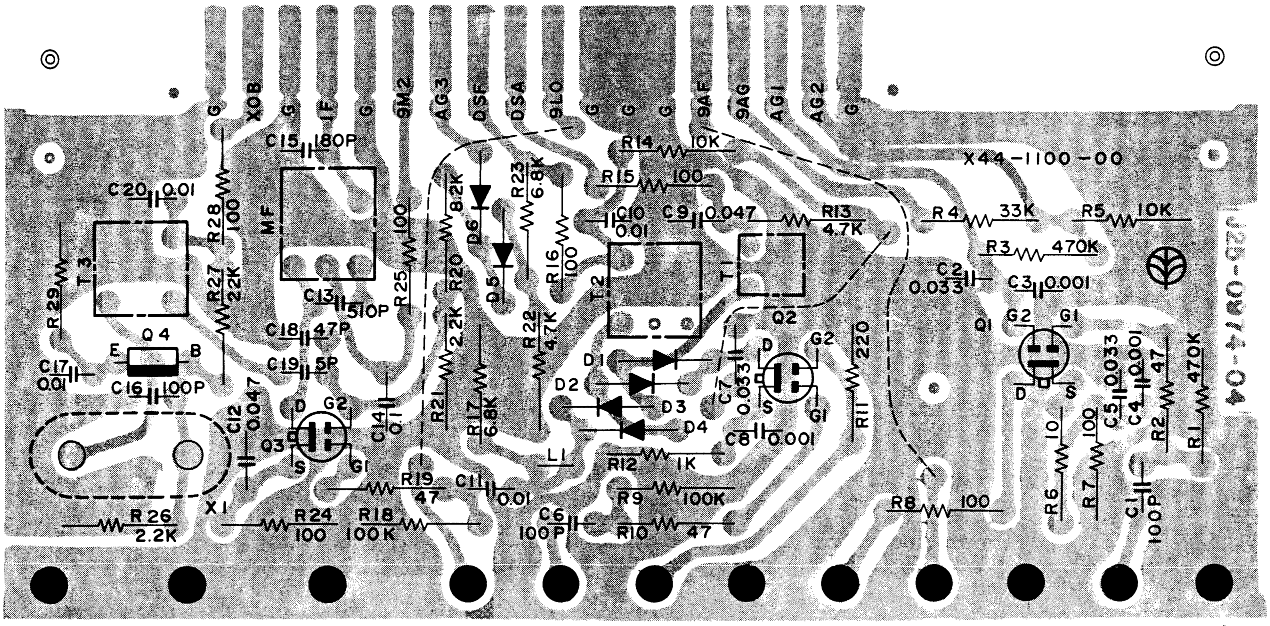
CHASSIS TOP VIEW



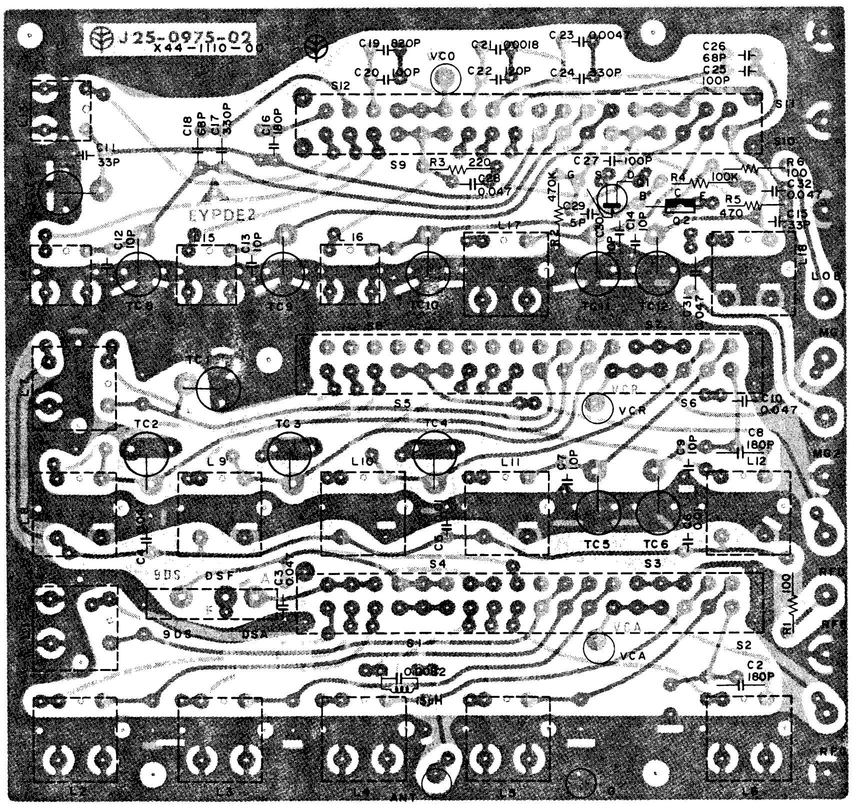


PC BOARD

RF UNIT (X44-1100-00)

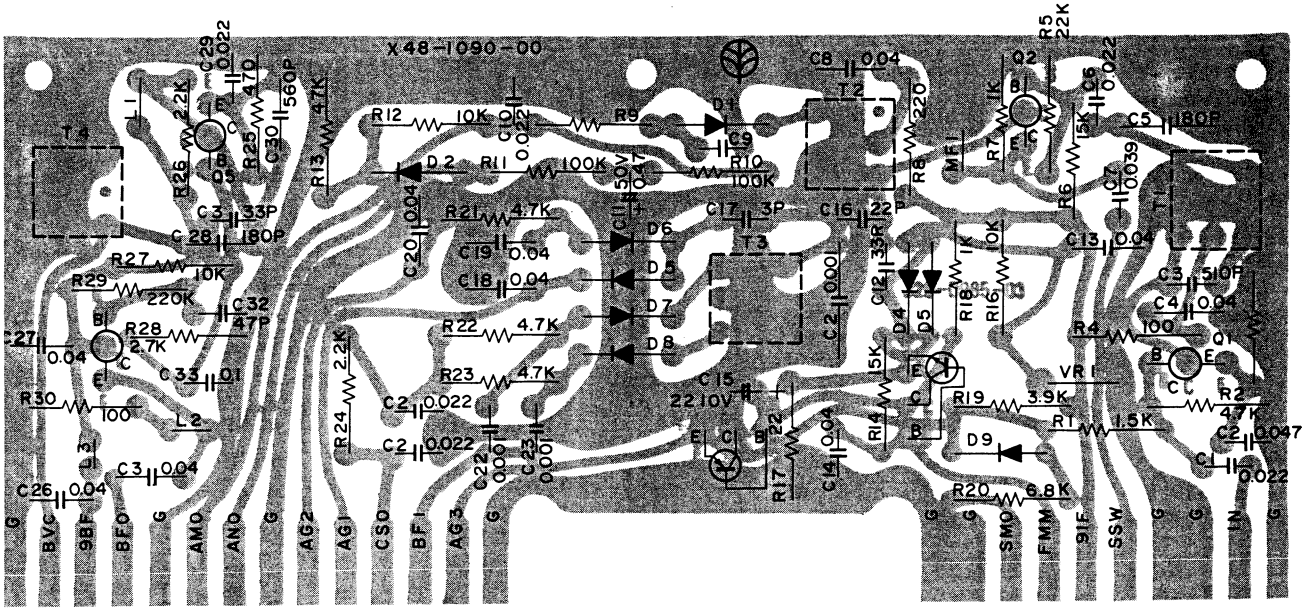


COIL PACK UNIT (X44-1110-00)

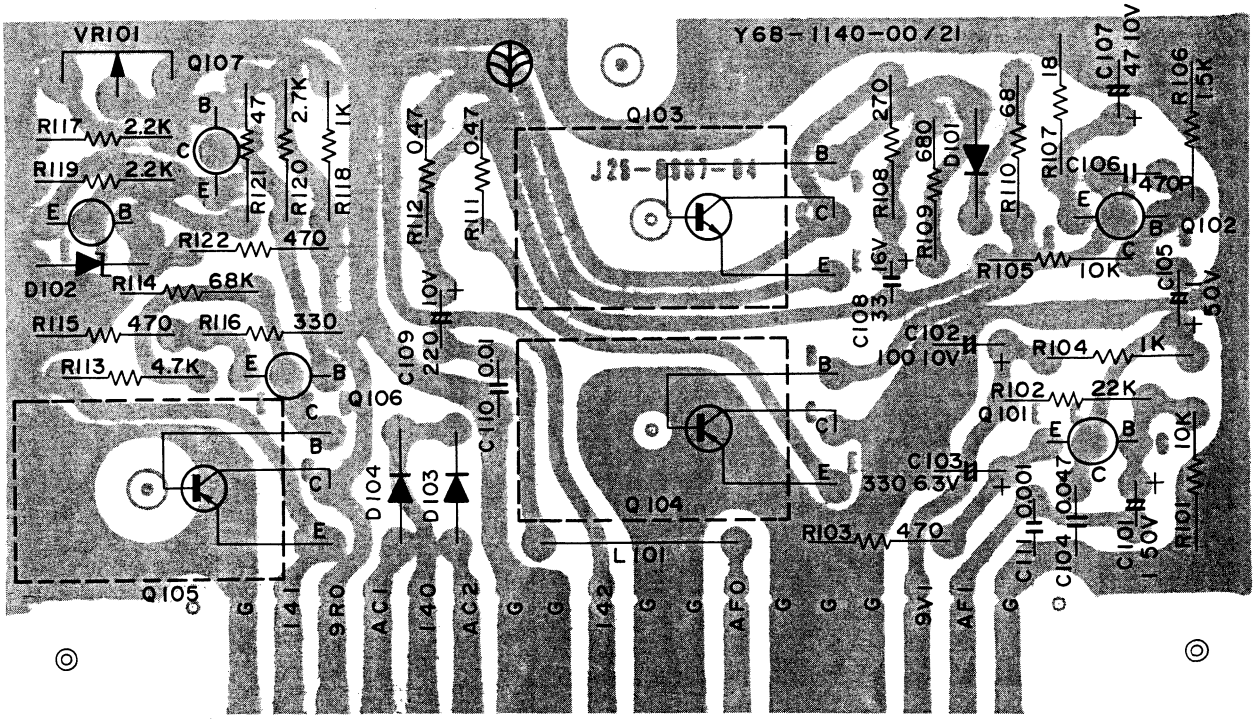


PC BOARD

IF UNIT (X48-1090-00)



AF, PS UNIT



PARTS LIST

Y68-1140-00

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
–	CE64W1E332	Electrolytic 3300μF 25WV	
–	CE04W1H010(RL)	Electrolytic 1μF 50WV	
–	CE04W1C330(RL)	Electrolytic 33μF 16WV	
–	CE04W1A470(RL)	Electrolytic 47μF 10WV	
–	CE04W1A101(RL)	Electrolytic 100μF 10WV	
–	CE04W0J331	Electrolytic 330μF 6.3WV	
–	CE04W1A221(RL)	Electrolytic 220μF 10WV	
–	CK45F1H103Z	Ceramic 0.01μF +80%,–20%	
–	CK45B1H102K	Ceramic 0.001μF ±10%	
–	CK45B1H471K	Ceramic 470pF ±10%	
–	CQ92M1H334M-NS	Mylar 0.33μF ±20%	
–	CQ92M1H223K-NS	Mylar 0.022μF ±10%	
–	CQ92M1H473K-NS	Mylar 0.047μF ±10%	
–	C90-0145-05	Polystyrene 0.01μF ±20%	
–	C01-0179-05	Variable capacitor (MAIN)	
–	C01-0180-05	Variable capacitor (SPREAD)	
–	C03-0025-05	Variable capacitor	
		RESISTOR	
—	R12-0042-05	Semi-fixed	
–	R92-0041-25	Metal	
–	RN14AB3G220K	Metal film 22Ω ±10% 2W	
–	RN14AB3D330K	Metal film 33Ω ±10% 2W	
–	R43-6218-05	Carbon	
–	R43-6247-05	Carbon	
–	R43-6268-05	Carbon	
–	R43-6227-15	Carbon	
–	R43-6233-15	Carbon	
–	R43-6210-25	Carbon	
–	R43-6215-25	Carbon	
–	R43-6222-25	Carbon	
–	R43-6227-25	Carbon	
–	R03-2031-05	Variable resistor	
–	R03-3017-05	Variable resistor	
–	R03-3054-05	Variable resistor	
		SEMICONDUCTOR	
–		Transistor 2SA755 (B or C)	
–		Transistor 2SC733 (Y)	
–		Transistor 2SC734 (Y)	
–		Transistor 2SC1000 (Y)	
–		Transistor 2SC1419 (B or C)	
–		Diode 1N60	
–		Diode 1S1555	
–		Diode V06B	
–		Zener diode RD-6AM	
		MISCELLANEOUS	
–	A01-0218-12	Case (A)	
–	A01-0219-02	Case (B)	
–	A10-0372-11	Chassis	
–	A20-0713-01	Panel body	
–	A20-0802-03	Panel assembly	
–	A22-0140-02	Sub panel	
–	A23-0439-12	Rear panel	

Ref. No.	Parts No.	Description	Remarks
–	B01-0080-02	Dial escutcheon	
–	B04-0050-04	Mesh board	
–	B05-0204-04	SP saran	
–	B08-3008-04	Ornament window	
–	B09-0003-05	Shaft joint	
–	B10-0134-04	Front glass	
–	B23-3010-04	Indicator	
–	B30-0007-05	Pilot lamp (12V 1.5W)	
–	B30-0048-05	Pilot lamp (8V 50mA)	
–	B31-0172-05	Meter	
–	B41-0125-04	Fuse name plate	
–	B42-0458-04	Name plate of adjustment	
–	B42-0524-04	Blind plate	
–	D09-0007-04	Dial drum (A)	
–	D09-0008-04	Dial drum (B)	
–	D09-0009-04	Dial drum (C)	
–	D15-0075-04	Small pulley	
–	D15-0083-04	Pulley	
–	D21-0331-04	Drive shaft	
–	D21-0332-04	Drive shaft	
–	D21-0333-04	Drive shaft	
–	D21-0334-04	Band shaft	
–	D22-0004-04	Shaft coupler	
–	D23-0018-04	Shaft stopper	
–	D23-0061-04	Bearing of plastic	
–	D23-0117-04	Bearing of metal	
–	E01-0801-05	US socket	
–	E04-0109-05	Receptacle, type M	
–	E08-0203-25	2P jack (connector)	
–	E08-0204-05	2P jack (consent)	
–	E08-0223-05	AC connector	
–	E09-0203-15	2P plug (connector)	
–	E09-0204-05	2P plug (consent)	
–	E10-1004-05	10P connector	
–	E10-1405-05	14P connector	
–	E10-1807-15	18P connector	
–	E11-0014-05	US jack	
–	E14-0801-05	US plug	
–	E15-0038-05	Pilot lamp socket	
–	E20-0305-04	3P terminal board	
–	E20-0509-05	Lug terminal, type T	
–	E22-0105-04	Lug board	
–	E22-0305-05	Lug board	
–	E22-0404-04	Lug board	
–	E23-0015-04	Grounding lug	
–	E29-0005-04	Lug terminal, type Y	
–	E30-0244-05	Press join lead	
–	E30-0245-05	Press join lead	
–	E30-0247-05	Press join lead	
–	E30-0321-05	AC cord	
–	F01-0114-04	Heat sink	
–	F05-1014-05	Fuse	
–	F05-1521-05	Fuse	
–	F09-0026-05	Battery case	
–	F10-0325-04	IF shield board	
–	F10-0326-04	AF shield board	
–	F15-0167-04	Switch mask	
–	F19-0140-04	Back cover	
–	F20-0084-04	Insulation board (Terminal)	
–	F20-0085-04	Insulation board (Coil pack)	
–	F29-0013-04	Insulation board (Ant)	

Ref. No.	Parts No.	Description	Re-marks
–	G01-0044-04	Dial spring	
–	G13-0014-04	Anti-vibration rubber	
–	J02-0049-14	Legs	
–	J13-0027-05	Fuse holder	
–	J13-0029-05	Fuse holder	
–	J19-0367-04	Meter stopper	
–	J19-0368-04	Speaker stopper	
–	J19-0369-04	Antenna holder	
–	J19-0370-04	Pulley holder	
–	J21-1169-04	Lamp stopper	
–	J21-1170-04	Drum stopper	
–	J21-1171-04	Bearing stopper	
–	J21-1172-04	Switch stopper	
–	J21-1173-04	V.C. stopper (A)	
–	J21-1174-04	V.C. stopper	
–	J21-1175-04	V.C. stopper	
–	J25-0986-04	Printed circuit board (Switch unit)	
–	J25-0987-04	Printed circuit board (AF, PS Unit)	
–	J30-0061-04	Rubber spacer	
–	J32-0117-04	Hexagonal boss	
–	J39-0026-04	Spacer	
–	J40-0002-04	Small bush	
–	J41-0027-04	Antenna bush	
–	J59-0001-05	Plunger	
–	J59-0002-05	Grommet	
–	K21-0274-04	Knob (Tuning)	
–	K21-0275-04	Knob (Gain)	
–	K21-0276-04	Knob (Ant Trm)	
–	K29-0168-05	Knob (Square)	
–	K21-0277-04	Knob (Band)	
–	K29-0169-04	Knob (Round)	
–			
T1	L09-0001-25	Power transformer	
L101	L33-0025-05	Heater choke coil	
–	S40-2039-05	Push switch (Lock)	
–	S40-2040-05	Push switch (Non-Lock)	
–	S40-4015-05	Push switch (Power)	
–	S42-5004-05	Push switch (5-Gang)	
–	T05-0006-05	Speaker	
–	T90-0070-05	Rod antenna	
–			
–	011-6001-05	Lead wire	
–	011-6111-05	Lead wire	
–	011-6221-05	Lead wire	
–	011-6331-05	Lead wire	
–	011-6661-05	Lead wire	
–	011-6771-05	Lead wire	
–	011-6981-05	Lead wire	
–	011-6961-05	Lead wire	
–	011-6921-05	Lead wire	
–	011-8222-05	Lead wire	
–	011-8442-05	Lead wire	
–	011-8662-05	Lead wire	
–	011-8992-05	Lead wire	
–	021-4001-05	Twisted wire	
–	021-4221-05	Twisted wire	
–	021-4991-05	Twisted wire	

Ref. No.	Parts No.	Description	Re-marks
–	030-0204-05	Parallel wire	
–	060-3001-05	Coaxial cable	
–	061-1501-05	Coaxial cable	
–	211-0402-05	Heat shrinkable tubing	
–	212-2008-05	Insulation tube	
–	351-0003-14	Dial cord string	
–	N14-0074-05	Speed nut	
–	N19-0004-04	Nylon washer	
–	N19-0057-04	Metal washer	
–	N19-0193-04	Large washer	
–	N19-0200-04	Nylon washer	
–	N29-0007-05	Eyelet	
–	X42-1060-00	Bundle wires unit	
–	X44-1100-00	RF unit	
–	X44-1110-00	Coil pack unit	
–	X48-1090-00	IF unit	
–	N10-2026-16	Hexagonal nut	
–	N10-2030-16	Hexagonal nut	
–	N10-2040-16	Hexagonal nut	
–	N15-1030-16	Washer	
–	N15-1040-16	Washer	
–	N16-0026-46	Spring washer	
–	N16-0040-46	Spring washer	
–	N17-1030-31	Internal lock washer	
–	N30-2606-11	Pan head screw	
–	N30-3004-11	Pan head screw	
–	N30-3008-15	Pan head screw	
–	N30-3012-11	Pan head screw	
–	N30-3014-11	Pan head screw	
–	N30-4008-11	Pan head screw	
–	N32-3008-11	Oval head screw	
–	N34-4008-15	Tap tight screw	
–	N35-2008-15	Bind screw	
–	N35-3006-15	Bind screw	
–	N35-3008-15	Bind screw	
–	N87-3006-46	Bracer tap tight screw	
–	N87-3010-46	Bracer tap tight screw	
–	N87-3014-46	Bracer tap tight screw	
–	N89-3008-45	Bind tap tight screw	
–	212-6505-05	Insulation tube	
–	002-0001-05	Braided wire	

■ X42-1060-00

Ref. No.		Description	Re-marks
	MISCELLANEOUS		
–	E09-0314-05	Connector	
–	011-6001-05	Lead wire	
–	011-6111-05	Lead wire	
–	011-6221-05	Lead wire	
–	011-6331-05	Lead wire	
–	011-6441-05	Lead wire	
–	011-6551-05	Lead wire	

Ref. No.	Parts No.	Description	Re-marks
–	011-6991-05	Lead wire	
–	011-6191-05	Lead wire	
–	011-6921-05	Lead wire	
–	011-6931-05	Lead wire	
–	011-6941-05	Lead wire	
–	011-6961-05	Lead wire	
–	011-6971-05	Lead wire	
–	011-6981-05	Lead wire	
–	011-8002-05	Lead wire	
–	011-8222-05	Lead wire	
–	053-1101-15	Shield wire	
–	053-1201-15	Shield wire	
–	053-1401-15	Shield wire	
–	053-1501-15	Shield wire	
–	053-1801-15	Shield wire	
–	053-1901-15	Shield wire	
–	060-3001-05	Coaxial cable	
–	061-1501-05	Coaxial cable	
–	212-0402-05	Insulation tube	
–	351-0004-05	Linen thread	

■ RF UNIT (X44-1100-00)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
–	CC45CH1M050D	Ceramic 5pF ±0.5pF	
–	CC45CH1M470J	Ceramic 47pF ±5%	
–	CC45CH1M101J	Ceramic 100pF ±5%	
–	CC45PH1M181J	Ceramic 180pF ±5%	
–	CK45D1H102M	Ceramic 1000pF ±20%	
–	CQ09S1H511J	Polystyrene 510pF ±5%	
–	CQ92M1H103K-NS	Mylar 0.01μF ±10%	
–	CQ92M1H333K-NS	Mylar 0.033μF ±10%	
–	CQ92M1H473K-NS	Mylar 0.047μF ±10%	
–	CQ92M1H104K-NS	Mylar 0.1μF ±10%	
		RESISTOR	
–	PD14BY2E100J	Carbon 10Ω ±5% 1/4W	
–	PD14BY2E470J	Carbon 47Ω ±5% 1/4W	
–	PD14BY2E101J	Carbon 100Ω ±5% 1/4W	
–	PD14BY2E221J	Carbon 220Ω ±5% 1/4W	
–	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
–	PD14BY2E152J	Carbon 1.5kΩ ±5% 1/4W	
–	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
–	PD14BY2E472J	Carbon 4.7kΩ ±5% 1/4W	
–	PD14BY2E682J	Carbon 6.8kΩ ±5% 1/4W	
–	PD14BY2E822J	Carbon 8.2kΩ ±5% 1/4W	
–	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
–	PD14BY2E223J	Carbon 22kΩ ±5% 1/4W	
–	PD14BY2E333J	Carbon 33kΩ ±5% 1/4W	
–	PD14BY2E104J	Carbon 100kΩ ±5% 1/4W	
–	PD14BY2E474J	Carbon 470kΩ ±5% 1/4W	
		SEMICONDUCTOR	
–		FET 3SK35	
–		Transistor 2SC460	
–		Diode 1S1555	
		COIL	
–	L30-0266-05	I.F.T.	
–	L30-0267-05	I.F.T.	
–	L32-0167-05	Oscillator coil	
–	L33-0112-05	Ferri-inductor	
–	L72-0026-05	Mechanical filter	
–	L77-0365-05	Crystal oscillator	
		MISCELLANEOUS	
–	J25-0974-04	P.C. board	
–	E23-0046-04	Terminal	
–	011-6661-05	Lead wire	
–	011-6191-05	Lead wire	
–	212-2008-05	Insulator tube	

■ COIL PACK UNIT (X44-1110-00)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
–	CC45CH1H050D	Ceramic 5pF ±0.5pF	
–	CC45CH1H100J	Ceramic 10pF ±5%	
–	CC45CH1H330J	Ceramic 33pF ±5%	
–	CC45PH1H680J	Ceramic 68pF ±5%	
–	CC45PH1H101J	Ceramic 100pF ±5%	
–	CC45CH1H101J	Ceramic 100pF ±5%	
–	CC45PH1H121J	Ceramic 120pF ±5%	
–	CC45PH1H181J	Ceramic 180pF ±5%	
–	CQ09S1H331J	Polystyrene 330pF ±5%	
–	CQ09S1H821J	Ploystyrene 820pF ±5%	
–	CQ09S1H182J	Polystyrene 1800pF ±5%	
–	CQ09S1H472J	Polystyrene 4700pF ±5%	
–	CQ92M1H103K-NS	Mylar 0.01μF ±10%	
–	CQ92M1H473K-NS	Mylar 0.047μF ±10%	
–	CQ93M1H822J	Mylar 0.0082μF ±5%	
–	C05-0010-15	PC trimmer	
–	C05-0013-15	PC trimmer	
		RESISTOR	
–	PD14BY2E101J	Carbon 100Ω ±5% 1/4W	
–	PD14BY2E221J	Carbon 220Ω ±5% 1/4W	
–	PD14BY2E471J	Carbon 470Ω ±5% 1/4W	
–	PD14BY2E104J	Carbon 1MΩ ±5% 1/4W	
–	PD14BY2E474J	Carbon 470kΩ ±5% 1/4W	
		DEMICONDUCTOR	
Q1		FET 2SK19 (GR)	
Q2		Transistor 2SC460 (B)	
		COIL	
L1	L31-0326-05	Tuning coil	
L2	L31-0327-05	Tuning coil	
L3	L31-0328-05	Tuning coil	
L4	L31-0329-05	Tuning coil	
L5	L31-0330-05	Tuning coil	

Ref. No.	Parts No.	Description	Re-marks
L6	L31-0331-05	Tuning coil	
L7	L31-0332-05	Tuning coil	
L8	L31-0333-05	Tuning coil	
L9	L31-0334-05	Tuning coil	
L10	L31-0335-05	Tuning coil	
L11	L31-0336-05	Tuning coil	
L12	L31-0337-05	Tuning coil	
L13	L32-0168-05	Oscillator coil	
L14	L32-0169-05	Oscillator coil	
L15	L32-0170-05	Oscillator coil	
L16	L32-0171-05	Oscillator coil	
L17	L32-0172-05	Oscillator coil	
L18	L32-0173-05	Oscillator coil	
L19	L33-0090-05	Ferri-inductor	
MISCELLANEOUS			
—	E19-0302-05	Connector	
—	E23-0046-04	Terminal	
—	J25-0975-02	P.C.board	
—	S29-3005-05	Rotary switch	

Ref. No.	Parts No.	Description	Re-marks
—	R12-1024-05	P.C. trimmer potentiometer	
SEMICONDUCTOR			
—		Transistor 2SA495 (Y)	
—		Transistor 2SC733 (Y)	
—		Transistor 2SC941 (O)	
—		Diode 1N60	
MISCELLANEOUS			
—	J25-0985-03	P.C. board	
T1	L72-0026-05	Ceramic filter	
T2	L30-0170-05	I.F.T.	
T3	L30-0175-05	I.F.T.	
T4	L32-0174-05	BFO coil	
L1	L33-0113-05	Ferri-inductor	
L2,3	L33-0105-05	Ferri-inductor	
CF1	L72-0027-05	Ceramic filter	

■ IF UNIT (X48-1090-00)

Ref. No.	Parts No.	Description	Re-marks
CAPACITOR			
—	CE04W1H010	Electrolytic 1μF 50WV	
—	CC45SL1H020C	Ceramic 2pF ±0.25pF	
—	CC45SL1H030C	Ceramic 3pF ±0.25pF	
—	CC45SL1H220J	Ceramic 22pF ±5%	
—	CC45CH1H330J	Ceramic 33pF ±5%	
—	CC45CH1H470J	Ceramic 47pF ±5%	
—	CC45SL1H101K	Ceramic 100pF ±10%	
—	CC45SL1H181K	Ceramic 180pF ±10%	
—	CC45PH1H181J	Ceramic 180pF ±5%	
—	CK45B1H102K	Ceramic 0.001μF ±10%	
—	CK45F1H223Z	Ceramic 0.022μF +80%,–20%	
—	CK45F1H403Z	Ceramic 0.04μF +80%,–20%	
—	CM93D2H561J(Z)	Mica 560pF ±5%	
—	CQ09S1H511J	Polystyrene 510pF ±5%	
—	CQ08S1H102J	Polystyrene 1000pF ±5%	
—	CM92M1H223K-NS	Mica 0.022μF ±10%	
—	CM92M1H393K-NS	Mica 0.039μF ±10%	
—	CM92M1H473K-NS	Mica 0.047μF ±10%	
—	CM92M1H104K-NS	Mica 0.1μF ±10%	
RESISTOR			
—	PD14BY2E101J	Carbon 100Ω ±5% 1/4W	
—	PD14BY2E221J	Carbon 220Ω ±5% 1/4W	
—	PD14BY2E471J	Carbon 470Ω ±5% 1/4W	
—	PD14BY2E561J	Carbon 560Ω ±5% 1/4W	
—	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
—	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
—	PD14BY2E222J	Carbon 2.7kΩ ±5% 1/4W	
—	PD14BY2E272J	Carbon 3.9kΩ ±5% 1/4W	
—	PD14BY2E392J	Carbon 4.7kΩ ±5% 1/4W	
—	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
—	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W	
—	PD14BY2E223J	Carbon 22kΩ ±5% 1/4W	
—	PD14BY2E224J	Carbon 220kΩ ±5% 1/4W	

ADJUSTMENTS

A test oscillator and a signal generator to be capable of being modulated within a frequency range of 170 KHz ~ 30 MHz are required to perform correct adjustments.
In this manual, a method of adjustment by using the TRIO RF signal generator "SG-402" will be described.
Fasten the whip antenna up to its limit and connect the cord of signal generator to the ANT terminal.
Positions of the knobs should be as follows:

BAND SPREAD	Full clockwise ("100" of hundred calibrations)
RF GAIN	Full clockwise
AF GAIN	Full counterclockwise
ANT TRM	Full rightward
BAND SELECTOR	A
FUNCTION	AM Push ON
SELECTIVITY	Push NARROW
STBY	OFF
BFO PITCH	Center position
POWER	OFF

Adjustment by using a signal generator

* The signal generator should be set at 30% amplitude modulation of 400 Hz or 1,000 Hz.
  (Modulation frequency and the degree of modulation may not be required to be correct.)
* The AF GAIN knob should be turned clockwise up to a point where the set noises of a receiver can be heard and perform the adjustment in accordance with the following charts.
* Adequate adjustment can be sought from the deflection of S-meter and a peak point of receiving sound. The output of the signal generator must be so adjusted that the S-meter indicates S-9 rank, without providing an overload to the receiver.
* A coil and a trimmer capacitor and the like should not be moved excessively since they are preadjusted by means of jigs. If a tuning point can not be obtained unless they are moved excessively, it should be understood that there must be any mistake.

Frequency signal generator	Band selector	Tuning dial frequency	Position of ANT TRM	Process	Location to be adjusted (A method of obtaining a peak point of S-meter)	Remarks
190 KHz	A	190 KHz	Full rightward	1	Rotate the core of A-band OSC coil until any signal can be heard. (L13)	When the output of a signal generator (hereinafter referred to as SG) is required to be reduced any more, turn the RF GAIN knob counterclockwise.
				2	Core of A-band ANT coil (L1)	
				3	Core of A-band RF coil (L7)	
				4	Core of RF unit T1	455 KHz IFT
				5	Core of RF unit MF	455 KHz mechanical filter
				6	Core of IF unit T1	Adjust from the rear panel side.
				7	Core of IF unit T2	
				8	Adjust the core of IF unit T3 and seek the minimum deflection of S-meter.	
380 KHz	A	380 KHz	Full rightward	9	Rotate the trimmer capacitor of A-band OSC until any signal can be heard. (TC7)	
				10	Trimmer condenser of A-band RF (TC1)	
190 KHz and 380 KHz	A	190 KHz and 380 KHz	Full rightward	11	Repeat the processes 1 ~ 3, 9 and 10 until the frequency of SG coincides with that of dial and the maximum signal can be obtained.	
600 KHz	B	600 KHz	Full rightward	12	Rotate the core of B-band OSC coil until any signal can be heard. (L14)	
				13	Core of B-band ANT coil (L2)	
				14	Core of B-band RF coil (L8)	

Frequency signal generator	Band selector	Tuning dial frequency	Position of ANT TRM	Process	Location to be adjusted (A method of obtaining a peak point of S-meter)	Remarks
1,200 KHz	B	1,200 KHz	Full rightward	15	Rotate the trimmer capacitor of B-band OSC until any signal can be heard. (TC8)	
				16	Trimmer capacitor of B-band RF (TC2)	
600 KHz and 1,200 KHz	B	600 KHz and 1,200 KHz	Full rightward	17	Repeat the processes 12 ~ 16 in this order until the frequency of SG coincides with that of dial and the maximum signals can be obtained.	
1.3 MHz	C	1.3 MHz	Center	18	Rotate the core of C-band OSC coil until any signal can be heard. (L15)	
				19	Core of C-band ANT coil (L3)	
				20	Core of C-band RF coil (L9)	
2.8 MHz	C	2.8 MHz	Center	21	Rotate the trimmer capacitor of C-band OSC until any signal can be heard. (TC9)	
				22	C-band RF trimmer capacitor (TC3)	
			Refer to right column	23	It should be understood to be normal if the peak of S-meter can be obtained within the range of scale by rotating the ANT TRM.	When any peak can not be obtained, repeat the same adjustment after shifting the ANT TRM leftward by one or two scales from the center in the process 19.*
1.3 MHz and 2.8 MHz	C	1.3 MHz and 2.8 MHz		24	Repeat the processes 18 ~ 23 in the ascending order until the frequency of SG coincides with that of dial and the maximum frequency can be obtained.	
3.4 MHz	D	3.4 MHz	2nd scale from the center (Leftward)	25	Rotate the core of D-band OSC coil until any signal can be heard. (L16)	
				26	Core of D-band ANT coil (L4)	
				27	Core of D-band RF coil (L10)	
7.0 MHz	D	7.0 MHz	2nd scale from the center (Leftward)	28	Rotate the trimmer capacitor of D-band OSC until any signal can be heard. (TC10)	
				29	D-band RF trimmer capacitor. (TC4)	
			Refer to right column	30	It should be understood to be normal if the peak of S-meter can be obtained by rotating the ANT TRM within the range of scale.	When any peak can not be obtained, repeat the same adjustment after shifting the ANT TRM leftward further more in the process 26.
3.4 MHz and 7.0 MHz	D	3.4 MHz and 7.0 MHz		31	Repeat the processes 25 ~ 30 in the ascending order until the frequency of SG coincides with that of dial and the maximum signal can be obtained.	
8.0 MHz	E	8.0 MHz	Center	32	Rotate the core of E-band OSC coil until any signal can be heard. (L17)	When the dial of receiver is adjusted to the SG signal of 17 MHz, the dial may be tuned at two places. It should be noted that the higher point is resulted from the real frequency, but the lower point is resulted from an image frequency.
				33	Core of E-band ANT coil (L5)	
				34	Core of E-band RF coil (L11)	
17.0 MHz	E	17.0 MHz	Center	35	Rotate the trimmer capacitor of E-band OSC until any signal can be heard. (TC11)	
				36	E-band RF trimmer capacitor (TC5)	

Frequency signal generator	Band selector	Tuning dial frequency	Position of ANT TRM	Process	Location to be adjusted (A method of obtaining a peak point of S-meter)	Remarks
17.0 MHz	E	17.0 MHz	Refer to right column	37	It should be understood to be normal if the peak of S-meter can be obtained within the range of scale.	When any peak can not be obtained, repeat the same adjustment after shifting the ANT TRM leftward further more in the process 33.
8.0 MHz and 17.0 MHz	E	8.0 MHz and 17.0 MHz		38	Repeat the processes 32 ~ 38 in the ascending order until the frequency of SG coincides with that of dial and the maximum signal can be obtained.	
19 MHz	F	19 MHz	Center	39	Rotate the core of F-band OSC coil until any signal can be heard. (L18)	When the dial of receiver is adjusted to the SG signal of 29 MHz, the dial may be tuned at two places if the SG signal is too large. It should be noted that the higher point is resulted from the real frequency, but the lower point is resulted from an image frequency.
				40	Core of F-band ANT coil (L6)	
				41	Core of F-band RF coil (L12)	
				42	Core of RF unit T2 (4.034 MHz IFT)	
29 MHz	F	29 MHz	Center	43	Rotate the trimmer capacitor of F-band OSC until any signal can be heard. (TC12)	
				44	F-band RF trimmer capacitor (TC6)	
			Refer to right column	45	It should be understood to be normal if the peak of S-meter can be obtained within the range of scale.	When any peak can not be obtained, repeat the same adjustment after shifting the ANT TRM leftward further more in the process 42.
19 MHz and 29 MHz	F	19 MHz and 29 MHz		46	Repeat the processes 39 ~ 41, 43 ~ 45 in the ascending order until the frequency of SG coincides with that of dial and the maximum signal can be obtained.	

TROUBLESHOOTING

AC Power Source Circuit

- Power source is not supplied.
  - Fuse blows out. Circuit breaker opens.
    - Check the wiring and intermediate route from the AC cord and the AC plug to the transformer.
- Lamp does not light.
  - Ascertain that a fuse is inserted.
  - Check miswiring from the AC plug to the primary side of the transformer and soldering thereto.
  - Contact failure of the AC consent and the AC plug.
  - Check miswiring and soldering to the STBY switch and the LIGHT switch.
    - Repair if there is any trouble.
- Meter and dial lamps do not light.
  - Check miswiring and soldering to the LIGHT switch and the lamp.
- AC/STBY lamp does not light.
  - Check miswiring and soldering to the STBY switch and the lamp.
- Lamps do not light and the fuse (0.5 A) at the primary side is disconnected.
  - Short-circuit and miswiring in the primary side of AC power source.
    - Check the wiring from the AC plug to the transformer and the intermediate route therebetween.
- Lamps do not light and the fuse (1 A) at the secondary side is disconnected.
  - Short-circuit and miswiring in the lamp circuit.
    - Check the wiring and soldering around the pilot lamp, STBY switch and LIGHT switch and perform repairing if there is any trouble.
- AC/STBY lamp does not put off even if the STBY switch is turned on, provided that the power switch is kept ON.
  - Check miswiring and soldering around the STBY switch.

- Meter and dial lamps do not put off even if the STBY switch is turned off and the LIGHT switch is turned on.
  - → Check miswiring and soldering around the LIGHT switch.

External Power Source Circuit and B-Power Supply Circuit

- When an external power source cord is inserted, spark occurs and fuses for the cord as well as the set blow out.
  - → Check the wiring from the outside to the power switch and repair if there is any mistake.
- When the power switch is turned on, fuses blow out.
  - → Check short-circuit and miswiring in the +B circuit.
- When the power switch is turned on, lamps light.
  - → Check short-circuit and miswiring to the switch.
    - → Check the STBY switch when the AC/STBY lamp lights. Check the light switch in the case of the dial lamp.
- When the STBY switch is turned on while maintaining the power switch to "ON".
  - → AC/STBY lamp does not light.
    - → Check miswiring of the STBY switch.
- When the LIGHT switch is turned on while maintaining the STBY switch to "OFF".
  - → Meter and dial lamps do not light.
    - → Check the lamps and the meter and miswiring therefor.

Built-in Battery Circuit

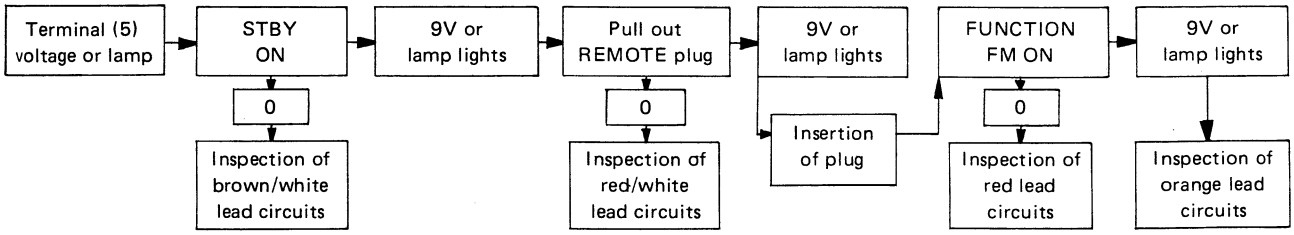
- When the plug of a built-in battery cord is inserted into the socket of a battery case, spark occurs and the cord is heated.
  - → Check short-circuit and miswiring relative to the battery cord.
    - → Check the wiring from the plug to the power switch and soldering associated therewith.

- When the STBY switch and the power switch are turned on while observing the AC/STBY lamp, it does not light.
  - Check miswiring and soldering around the power switch.

+B Power Source Lines

- When the STBY switch and the power switch are turned on while observing the AC/STBY lamp, it does not light.
  Otherwise, the fuse is disconnected.
  - Check the voltage of "+B". The "+B" circuit may be short-circuited within the AF/PS unit.
    - Check the wiring at the secondary side of the transformer.
    - Check all of parts connected to the terminals 141, AC1, 140, AC2 and 142 of the AF/PS unit.
- When the STBY switch is turned off and the LIGHT switch is turned off, meter and dial lamps do not light, or their brightness does not change.
  - Check the connection to the resistor 22Ω, 4W.

Checking Diagram of Short-Circuit of 9V Line



AF Circuits

- No sound is provided.
  - Miswiring relative to volumes, speaker and phonojacks, or defective soldering.
    - Check volumes (white, green shield wire), speaker (red, black strand wire), phonejack (white lead wire), AF socket (white lead wire) and remote socket (white lead wire).
- Sound volume does not change even if variable resistors are rotated.
  - Check miswiring and soldering to variable resistors and switch units.

CIRCUIT DESCRIPTION

1. QR-666 configuration

The QR-666 is an all solid state 6-band communications receiver capable of receiving AM, CW or SSB transmissions over a frequency range of 170 KHz ~ 30 MHz. As shown in the overall block diagram both the RF amplifier and mixer employ 3SK35 FETs and also double conversion is employed in the F band for improved intermodulation and image rejection characteristics. The overall circuit consists of the coil pack and local oscillators, the RF unit, the IF unit, and finally the AF unit and stabilized power supply contained on four printed circuit boards. A description of the signal path will now be given with reference to the block diagram.

2. RF amplifier (RF unit, Coil pack)

The signal from the antenna enters the tap on the antenna tuning coil via the RF gain potentiometer. The antenna coil is divided into six bands and is tuned by the main tuning and spread variable capacitors and the antenna trimmer.

The design input impedance is 50 ~ 75Ω

The signal then enters the first gate of the 3SK35 MOS type dual gate field effect transistor (FET) where it is amplified and enters the RF coil.

Stable amplification is achieved as a result of both the low feedback capacitance (0.02 PF) of the 3SK35 and the existence of R2, R6, R8. An AGC voltage derived from the IF detector stage is applied to the second gate of the 3SK35 to effect gain control.

3. Mixer – Output tuning circuit changeover switch (RF unit)

The amplified RF signal is applied to the first gate of the 3SK35 and mixed with the local oscillator frequency which is applied to the second gate. The resulting difference, i.e. the IF frequency, which appears as the mixer output is 455 KHz in the case of bands A ~ E, and 4.034 MHz in the case of the F band.

Owing to its extremely low intermodulation and frequency pulling the MOS type dual gate FET is ideal as a mixer element. Cutover from the 455 KHz IFT to the 4.034 MHz IFT is performed by the diode switches D1, D4 which are interlocked with the band switch. When using the 455 KHz (A ~ E) frequency, current from the 9 V power supply flows through the two circuits R15 → T1 → D1 → and R15 → T1 → D3 → L1 → R17. The diodes D1, D3 are thus turned on and the 455 KHz signal is obtained via the path 3SK35 → D1 → T1 → D3 → C11. In the same way, when using the F band, D2 and D4 are turned on and the 4.035 MHz signal is obtained via the path 3SK35 → D2 → T2 → D4 → C11.

4. Local oscillator circuit (Coil pack)

In order to generate a stable oscillator output over the frequency range 625 KHz ~ 34.034 MHz required by the QR-666 a drain grounded Hartley oscillator employing a type 2SK19 field effect transistor is used for the local oscillator.

Furthermore, in order to ensure a stable oscillator output at the high F band frequencies the oscillator output at the high F band frequencies the oscillator circuit is integral with the coil pack. A buffer stage employing 2SC460 as an emitter follower is used to ensure that there is no pulling effect exerted by the mixer on the oscillator.

The oscillator frequency is 455 KHz higher than the signal frequency in the bands A ~ E, and 4.034 MHz higher than the signal frequency in the case of the F band. These frequencies are shown below.

A	0.625 ~ 0.865 MHz
B	0.98 ~ 1.705 MHz
C	1.705 ~ 3.455 MHz
D	3.455 ~ 7.955 MHz
E	7.955 ~ 18.455 MHz
F	22.034 ~ 34.034 MHz

5. Second mixer/IF amplifier and F band conversion crystal oscillator circuit (RF unit)

The 455 KHz and 4.034 MHz conversion signals enter the first gate of Q3 3SK35. This stage acts as a 455 KHz amplifier for bands A ~ E and as a 455 KHz mixer for the F band, conversion in the latter case being achieved by injecting a 3.579 MHz conversion signal into the second gate of Q3.

The output is fed into a mechanical filter which makes for a high degree of selectivity.

As the optimum bias point for Q3 when used as a 455 KHz IF amplifier is different from that when used as a second mixer, diode switches D5, D6 are used interlocked with the band switch to cut over the bias point. When using Q3 as an IF amplifier no voltage is applied to D5 and as a result the latter remains in the OFF condition. The AGC voltage is applied via D6 to control the gain.

When the stage is used as a second mixer a voltage greater than the AGC voltage is applied as a fixed bias to the FET via D5. As a consequence D6 is turned off and no AGC voltage is applied to the mixer.

Q4 2SC460 is used as part of a 3.579 MHz crystal oscillator which is used as the secondary local oscillator for the double conversion stage in the F band only. The ouptut from coil T3 is reduced by means of C18 and C19 and then fed to the second gate of the second mixer.

6. IF amplifier (IF unit)

The 455 KHz IF amplifier consists of two 2SC941 stages the first of which is supplied with AGC voltage for gain control. The signal selectivity of a receiver is determined almost entirely by the IF circuit and in the case of the QR-666 a two-stage mechanical filter is used in conjunction with a ceramic filter which can be switched in or out of circuit to obtain the necessary selectivity. The selectivity in the WIDE position is 5 KHz (6 dB bandwidth) and in the NARROW position is 2.5 KHz.

The ceramic filter connected to the emitter of Q2 acts like a frequency selective bypass capacitor and acts to reduce the gain of Q2 as the frequency deviates from 455 KHz.

7. AGC amplifier (IF unit) and S-meter circuit

The IF signal from the collector of Q2 is applied to the voltage doubler detector citcuit D3, D4 via C12. The detected output is then amplified by Q3 2SC733 and Q4 2SA495 and applied to the IF amplifier as an AGC (Automatic Gain Control) voltage. In the same way the signal from the collector of Q2 which is applied to the voltage doubler detector circuit (D5, D6) via C13 is used as the AGC voltage for the RF amplifier and controls the gain of the latter in accordance with the strength of the incoming signal.

In the case of the AGC for the IF amplifier the positive voltage derived from the signal detected by D3, D4 is applied to the base of Q3. As the collector current of Q3 flows in proportion to the magnitude of the voltage the collector voltage of Q3 (and also the base voltage of Q4) will drop on account of R18 and current will also flow through Q4. As a result the emitter voltage of Q4 (This is both the AGC voltage and the bias voltage of the IF amplifier) drops thus reducing the gain of the IF amplifier.

In the case of the AGC for the RF amplifier the negative voltage derived from the signal detected by D5, D6 is applied across resistor R3 which is in series with the bias circuit of the second gate of the RF amplifier FET. The voltage at the second gate thus drops to control the amplifier gain.

The S-meter uses the AGC voltage of the IF stage to indicate signal strength.

8. AM detector circuit and ANL (IF unit)

A diode linear detector is used for AM detection. The positive half of the carrier of the signal derived from the secondary side of T2 in the final IF stage is eliminated by diode D1 and after being filtered by C9, R9 and C10 the envelope is obtained as an audio frequency signal.

ANL is an abbreviation for Automatic Noise Limiter and is a circuit consisting of a diode inserted in series between the detected output and the audio amplifier. This diode is switched in accordance with the amplitude of the noise signal and thus acts to limit the noise.

With reference to the schematic, when the signal enters the circuit the carrier is rectified by D1 resulting in a negative voltage at point A. This voltage is applied to point C via R10 and R11. Moreover, as a voltage, reduced by R12 and R13, appears at point B the potential at the latter point becomes slightly negative with respect to C and as a result diode D2 conducts thereby passing the signal. If now large amplitude pulse noise appears with the signal a large negative voltage will appear at point A which will, after being attenuated in proportion to the ratio of R12 and R13, be applied to point B. However, until C11 charges up via R10 no noise voltage will appear at point C. In other words for a period equal to the time constant of R10, C11 the voltage at point C will be higher than the voltage at point B resulting in D2 being cut off to block the audio frequency output and thus control the noise level.

9. CW/SSB detector circuit and BFO circuit (IF unit)

A balanced detector circuit is used for CW and SSB detection. The CW/SSB signal which is fed from the final IF stage via C16 to T3 is mixed with the BFO signal in a balanced detector circuit consisting of T3, D7, D8, R22 and R23 thus converting it to an audio frequency signal. The balanced detector is simple yet highly efficient and can accomodate both weak and strong signals without saturating.

The BFO circuit consists of a base grounded colpitts' oscillator having a Hi-C, Low-L configuration which results in temperature and drift characteristics which are sufficiently stable for SSB reception.

Furthermore an emitter follower buffer stage is interposed between the BFO and the detector citcuit eliminating problems of impedance matching and frequency pulling etc. The BFO frequency can be varied, by means of the BFO pitch control, over the range 455 KHz ± 3 KHz.

10. AF amplifier (AF · PS unit)

The detected audio signal passes through the AF Gain Control to be amplified by the AF preamp transistor Q101 2SC1000. The output of the preamp is fed to the AF drives transistor Q102 2SC734.

In order to drive the push-pull power amplifier the collector circuit of Q102 is somewhat complicated: R110 and D101 are used to supply a suitable degree of biassing to Q103 & Q104, and R109 is the load resistor for Q102 while R108 and C108 serve to raise the equivalent load resistance and thereby increase the gain of Q102.

The power amplifier is in what is known as a complemental OTL configuration is which an NPN and a PNP transistor are, for D.C. purposes, connected in series but for A.C. purposes operate in parallel.

The audio signal enters the bases of both Q103 and Q104 in phase so that Q103 operates on the positive signal excursion while Q104 operates on the negative signal excursion.

11. 9 V stabilized power supply (AF · PS unit)

With the exception of the AF power amplifier a 9 V stabilized power supply is used to power the QR-666 making for stability of operation.

A voltage of 10 ~ 15 V is applied to the emitter of Q105 to give an output of 9 V at its collector. If the output voltage for some reason or another deviates from 9 V the voltage fluctuation is detected by means of an error voltage detector circuit comprising a 6 V zener diode and a differential amplifier consisting of Q107 and Q108. This error voltage is amplified by Q106 and applied to the base of Q105 to eliminate the error and maintain a constant output of 9V.

VR1 is a potentiometer which is used to set the output voltage to 9 V. This circuit also incorporates built-in protection which limits the current drawn even if the output is short circuited.

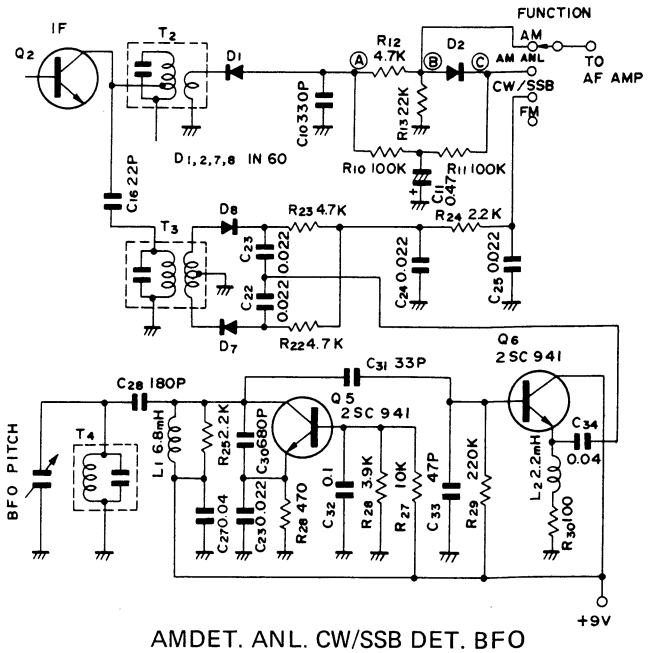
12. Power supply circuit and pilot lamp circuit

The AC 220 V mains voltage is reduced by means of power transformer. The 14 ~ 14.5 V B voltage which is full-wave rectified by D103, D104 is fed to the AF power amplifier and the voltage stabilizer circuit. The diodes D3 and D5 situated between the interval battery circuit, the external DC power supply circuit and the B voltage line perform the function of short protection and automatic cutover from AC to DC voltage sources. If the AC supply is connected while the internal batteries are fitted the potential at the B side at D3 becomes 14 V while the potential at the A side is 12 V. As a result D3 becomes reverse biassed and prevents the flow of current from the battery. If the AC cord is then removed or if for some reason the AC mains supply is cut off the voltage at the B side of the diode disappears thus turning D3 on and permitting the internal battery to operate the receiver.

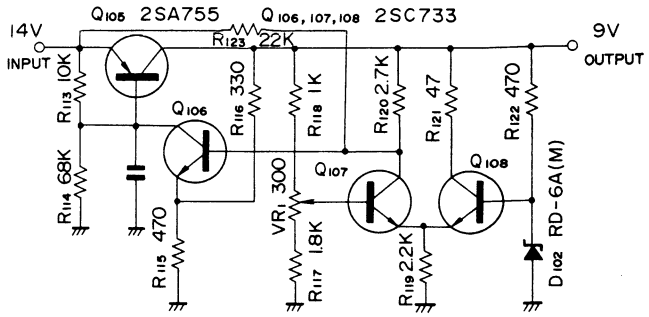
There are two types of pilot lamp which are used for illumination of the S-meter and dial and for indicating AC/STBY, respectively. In the case of the QR-666 the current consumed by the lamps is greater than the current consumed by the circuitry.

Consequently the circuit is arranged so that when using the internal battery the lamps light up only when the switch is pressed. Furthermore when using the external mains supply the normal voltage for the lamps is supplied via D4 whereas when using the internal batteries the current is maintained at a low valve by means of R2 to minimize power drain on the batteries.

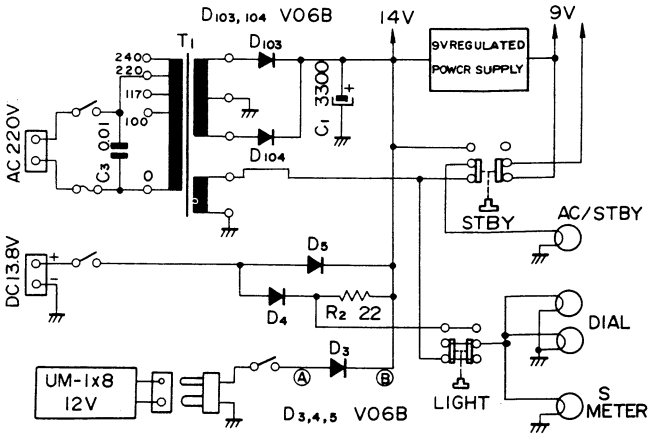
The AC/STBY lamp lights up both when using the AC mains and also when in standby.



AMDET. ANL. CW/SSB DET. BFO



9V AVR

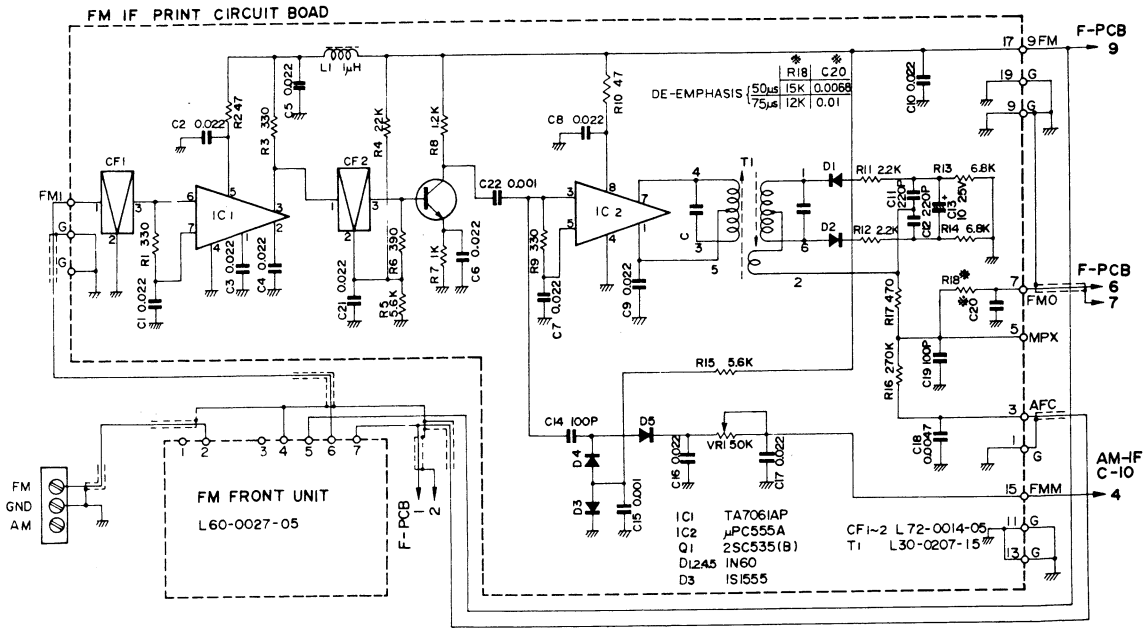


Power Supply

HOW TO INCORPORATE OPTIONS

QR-6FM

The OR-6FM is an option for receiving FM broadcast waveband (87.5 ~ 108 MHz) of the QR-666.



Assembly and Wiring

Assembly of FM tuner portion

Provisionally attach the bevel gear to the FM tuner and fix it to the tuner mounting hardware.

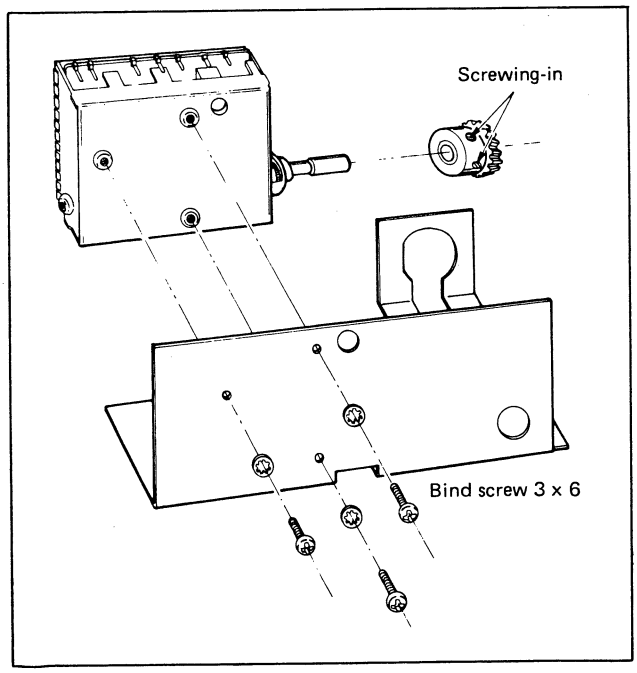


Fig. 1

* Fasten the blind plate to a chassis together by means of the vernier shaft.
* Attach the shaft joint to the vernier shaft.
  At this juncture, it should be attached with a gap of approximately 0.5 mm so that the head of screw may not come in touch with the vernier.
* Fit the bearing in a tuner mounting hardware.
* Set the shaft to the bearing and put on the bevel gear and fasten by means of screws of the shaft joint.
* Fasten by adjusting set screws so that the tooth portion of two bevel gears engage with each other.
* Ascertain that the tuner variable capacitor rotates with smooth by turning the vernier shaft.

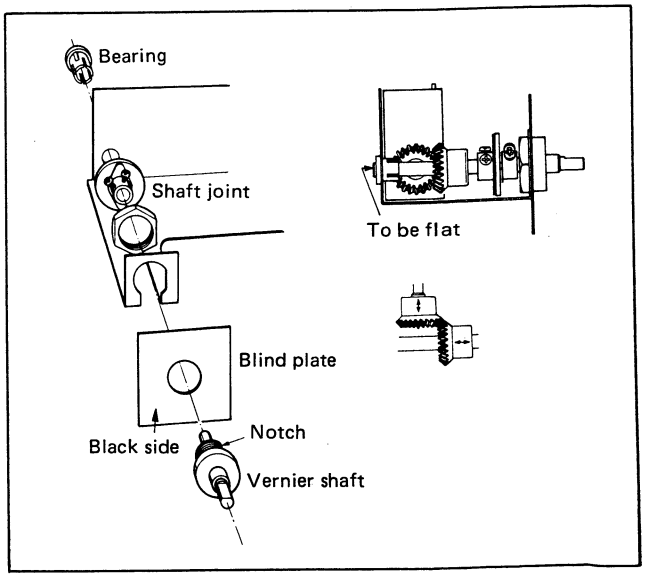


Fig. 2

FM/IF Unit

R1	Orange/Orange/Brown	330Ω
R2	Yellow/Purple/Black	47Ω
R3	Orange/Orange/Brown	330Ω
R4	Red/Red/Orange	22kΩ
R5	Green/Blue/Red	0.6kΩ
R6	Orange/White/Brown	390Ω
R7	Brown/Black/Red	1kΩ
R8	Brown/Red/Red	1.2kΩ
R9	Orange/Orange/Brown	330Ω
R10	Yellow/Purple/Black	47Ω
R11	Red/Red/Red	2.2kΩ
R12	Red/Red/Red	2.2kΩ
R13	Blue/Gray/Red	6.8kΩ
R14	Blue/Gray/Red	6.8kΩ
R15	Green/Blue/Red	5.6kΩ
R16	Red/Purple/Yellow	270kΩ
R17	Yellow/Purple/Brown	470Ω
R18	Brown/Green/Orange	15kΩ
C1 ~ C4	Film	223K
C5 ~ C10	Ceramic	223Z
C11, 12	Ceramic	221K
C13	Electrolytic	2.5V 10μF
C14	Ceramic	101K
C15	Ceramic	102M
C16, 17	Ceramic	223Z
C18	Film	472K
C19	Ceramic	101K
C20	Film	682J
C21	Ceramic	223Z
C22	Ceramic	102K
VR1	Semi-fixed resistor	
L1	Ferri-inductor	
3-pin connector		
CF1	Ceramic filter	
CF2	Ceramic filter	
T1	Discrete coil	

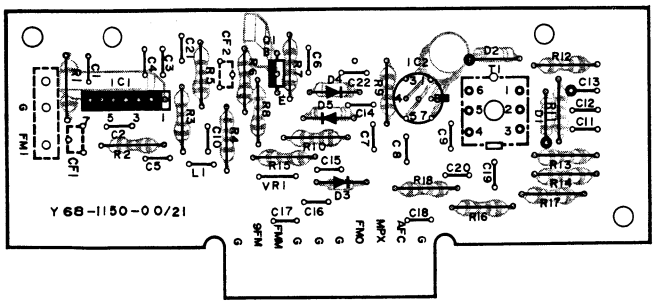


Fig. 3

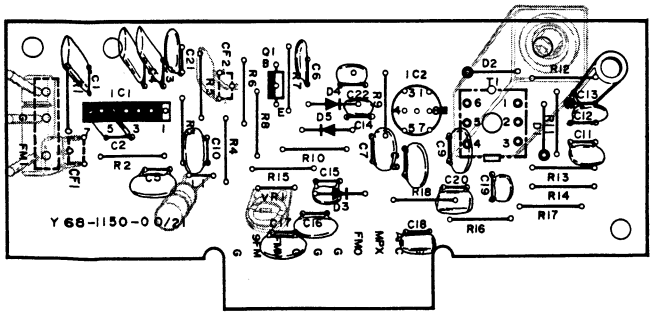


Fig. 4

Other Operations

Perform a solder plating to two places specified in the drawing. Attach the hexagon boss to the places where the soldering is performed.

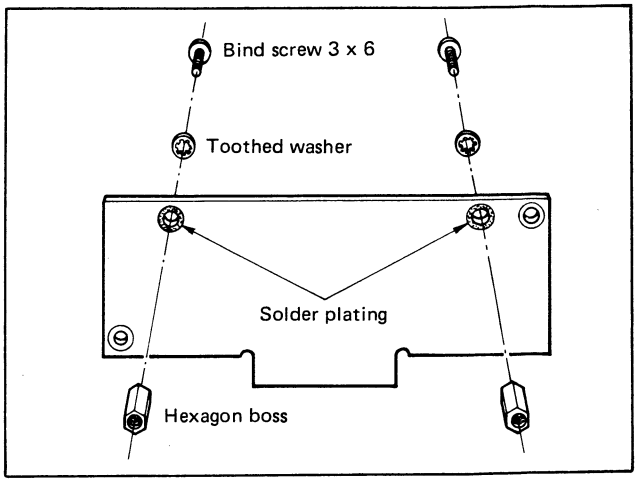


Fig. 5

Wiring Operations

Preparatory working of wire materials

Unit (mm)

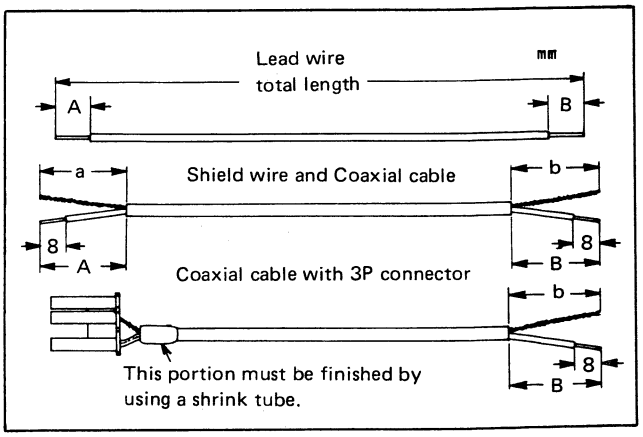


Fig. 6

Wire materials	Total length	Length to be stripped			
		A		B	
White single wire	300	8		8	
Brown/White single wire	750	8		8	
Brown/White single wire	180	8		8	
		A	a	B	b
Black shield wire	720	20	20	20	20
Green shield wire	550	20	20	30	20
Green shield wire	170	20	20	30	20
Black coaxial cable	280	20	20	20	10
Coaxial cable with 3P connector	230	–	–	20	20

Attach the assembled FM tuner portion to the main body (QR-666).

* When the marker unit (QR-6MK) is already installed, disconnect one side of a red/white lead wire temporarily and pass through the under part of the shaft joint.

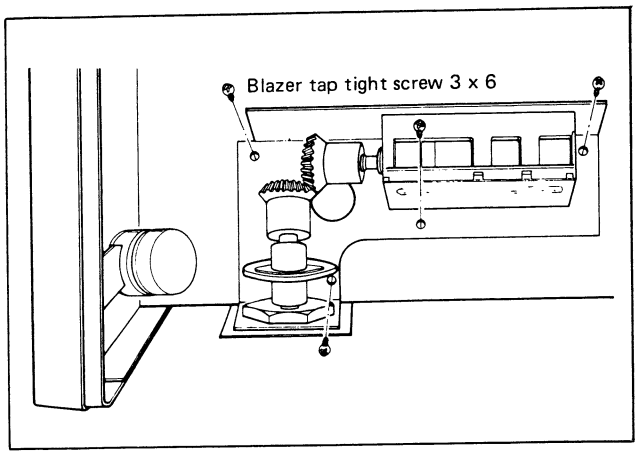


Fig. 7

Mounting of 10-pin Connector Socket

Set the socket in place so that No. 1 terminal is located at the rear panel side. (Opposite side of AF/PS unit)

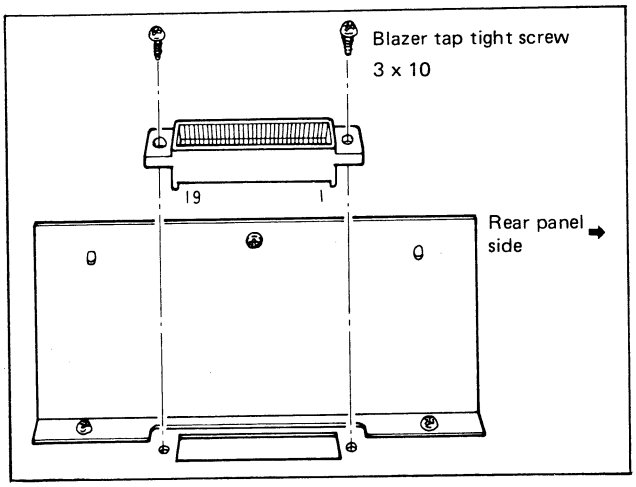


Fig. 8

Wiring Operations of Each Part

Bind No. 19, 13, 9 and 1 terminals of the IF connector socket A and an earth tongue with a tin-plated wire and perform the soldering to the terminals 19, 13 and 9 and the earth tongue.

IF connector A15 ★ → White single wire 300 mm → IF connector B7 ★

* For convenience sake, the IF connector socket is called as IF connector.

IF connector 17 ★ → Brown/White lead wire (750 mm) → Switch unit 9 ★

Switch unit 9 ★/2 → Brown/White lead wire (180 mm) → FM tuner 5 ★

IF connector A7 ★ → Core of black shield wire (720 mm) → Switch unit 6 ★

IF connector A11 ★ → Earth side of black shield wire (720 mm) → Switch unit 7 ★

IF connector A3 ★ → Core of green shield wire (550 mm) → FM tuner 7 ★

IF connector A1 ★/2 → Earth side of green shield wire (550 mm) → FM tuner 4

Switch unit 2 ★ → Core of green shield wire (170 mm) → FM tuner 7 ★/2

Switch unit 1 ★ → Earth side of green shield wire (170 mm) → FM tuner 4 ★

Antenna terminal (3 pins) 3 ★ → Core of black coaxial cable (280 mm) → FM tuner 2 ★

Antenna terminal (3 pins) 2 ★ → Earth side of black coaxial cable (280 mm) → Frame of FM tuner

3P connector (Already wired) → Core of coaxial cable (230 mm) → FM tuner 6 ★

3P connector (Already wired) → Earth side of coaxial cable (230 mm) → FM tuner 4 ★/8

* This coaxial cable should be passed through the under side of the shafts of the main and spread variable capacitor.

Wire Binding Operations

Binding should be performed together with other wires by means of a vinyl tie at six places indicated in the drawing.

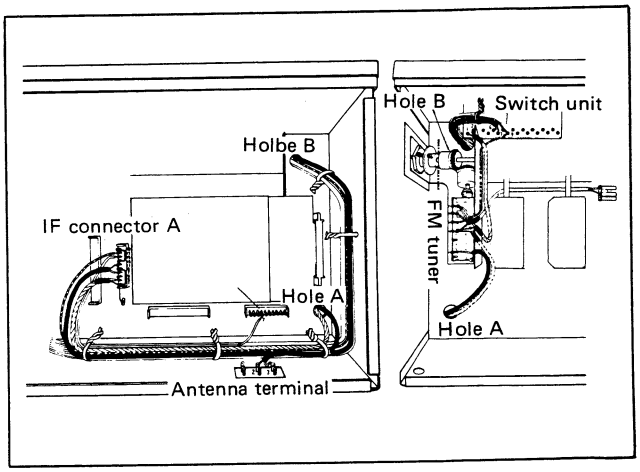


Fig. 9

Adjustments

Caution on adjustments

Only the IFT and the discriminator coils should be adjusted since the RF portion of the FM tuner unit has been already adjusted completely.

Preparation

Insert the IF unit and the coaxial cable with a 3-pin connector into the 10P connector socket and the 3-pin terminal (G. FM1), respectively.

FUNCTION	FM · BC (Push)
FM AFC	OFF (The knob should be placed under the projected condition.)

Adjustment of the primary sides of IF and discriminator coils

Connect the FM antenna and adjust the IFT of FM tuner so that the maximum deflection is obtained in the S-meter, while receiving radio broadcasting correctly.

* The VR1 (50kΩ) should be adjusted when the meter is deflected excessively in either direction.

The sound volume should be maximized by turning the core (inner side) at the primary side of the discrete coil.

Adjustment of the secondary side of descriminator coil

Ideal adjustment

Improper adjustment

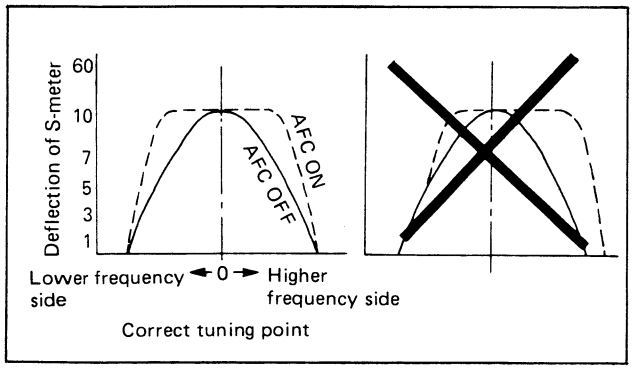


Fig. 10

Slightly shift the reception frequency to higher side to lower the deflection of S-meter.

Return the deflection of S-meter to its initial position by turning on the FM AFC switch and rotating the core at the secondary side (this side) of the discriminator coil.

Similarly, slightly shift the reception frequency to lower side after turning off the AFC and return the deflection of S-meter to its initial position by turning on the AFC and rotating the core at the secondary side of the discriminator coil.

Thereafter, widen the range of reception frequency to be shifted little by little and adjust repeatedly so that the meter is returned under almost similar condition in both direction.

Receive the most strongest broadcasting electric wave and adjust the VR1 (50KΩ) so that the meter is deflected up to full scale.

Adjustment of the secondary side of discriminator coil by using a circuit tester and the like

Adjust the meter needle of circuit tester to center zero and set the range to "DC 3V".

Connect the circuit tester to the detection output FMO (10-pin connector socket 7) of the FM IF unit and the earth circuit or chassis.

Receive a certain radio broadcasting and seek a tuning so as to obtain the maximum deflection of S-meter.

Adjust the core at the secondary side of the discriminator coil so that the needle of the circuit tester remains at the "0" position.

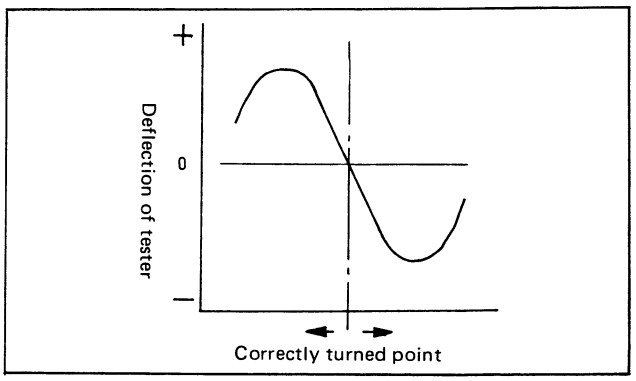


Fig. 11

Mounting of FM/IF unit

Disassemble the AF/PS unit temporarily and fix the FM/IF unit by using two screws.

Mount the AF/PS unit in place.

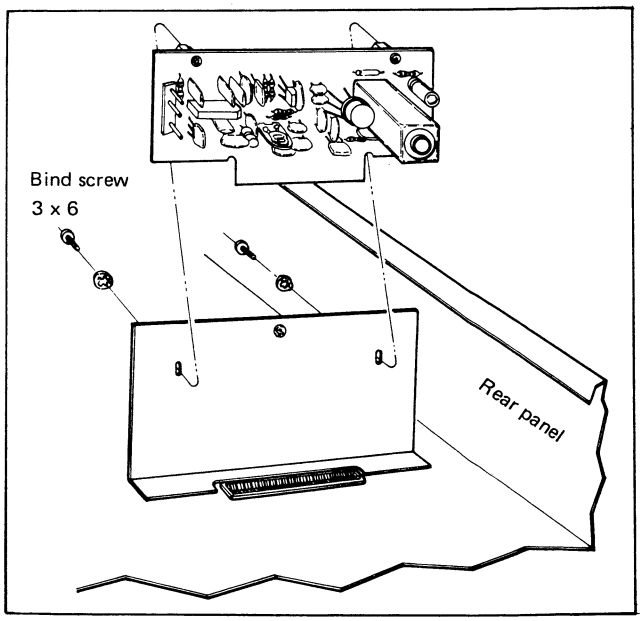


Fig. 12

Mounting of ornamental window

Insert the ornamental window into the case and fix it by means of the stopper ring.

Mounting of tuning knob

Insert the tuning knobs A and B into place in this order. Fix the knob screw by using a tool as accessory.

After receiving the desired radio broadcasting, adjust the frequency of the broadcasting station and numerals on the tuning knob A to the ornamental window and then tighten the screw of the tuning knob A.

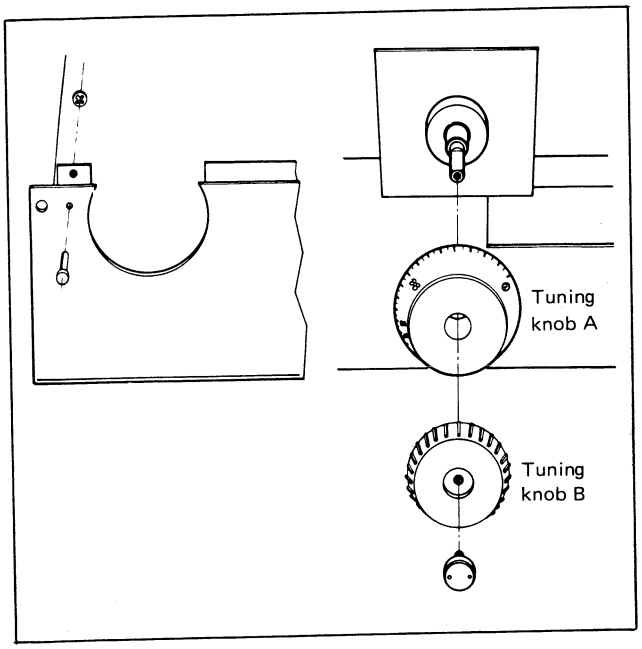


Fig. 13

How to make T-type FM antenna (Short-distance)

Materials: 300Ω feeder (Not supplied as accessory)

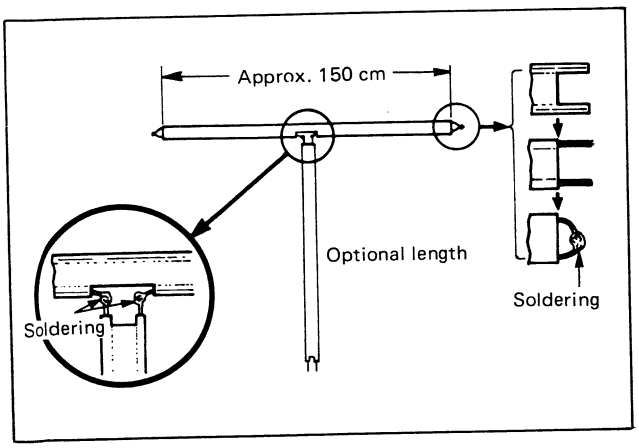


Fig. 14

This antenna should be fixed by means of wood screws or nails at both sides after determining the most effective direction by turning by 180 degrees while maintaining the upper portion of the antenna at level.

When the T-type FM antenna is found to be ineffective, that is, it is located far from broadcasting stations or behind a building, a FM antenna comprising 5 ~ 7 elements should be installed at as higher place as possible.

QR-6MK

The QR-6MK is a marker option for the QR-666 and has advantages as follows.

a) Since the oscillation frequency is 500 KHz and the dial scale can be checked every 500 KHz, the calibration of band spread scale can be made with ease.

b) Since the oscillation and the shaping of waveform are carried out by individual transistors, the stability of circuit is extremely high in spite of compact.

c) This unit can be attached to and used together with the QR-666 without modifying the already wired portion.

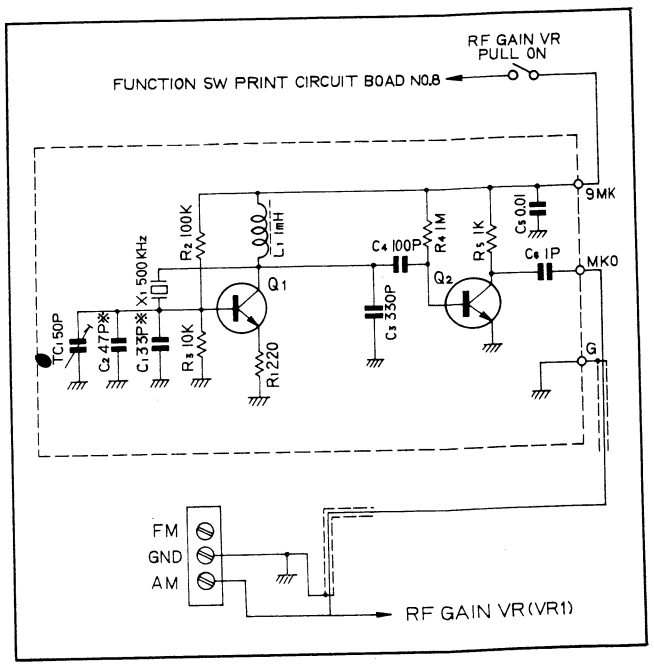


Fig. 15

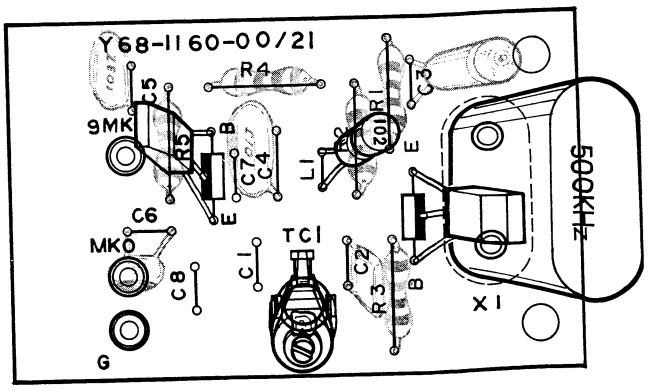


Fig. 16

Mounting of L-hardware

Perform solder plating around two mounting holes on the P.C.B.

Mount two L-hardware by using two bind screws (Black 3 x 6).

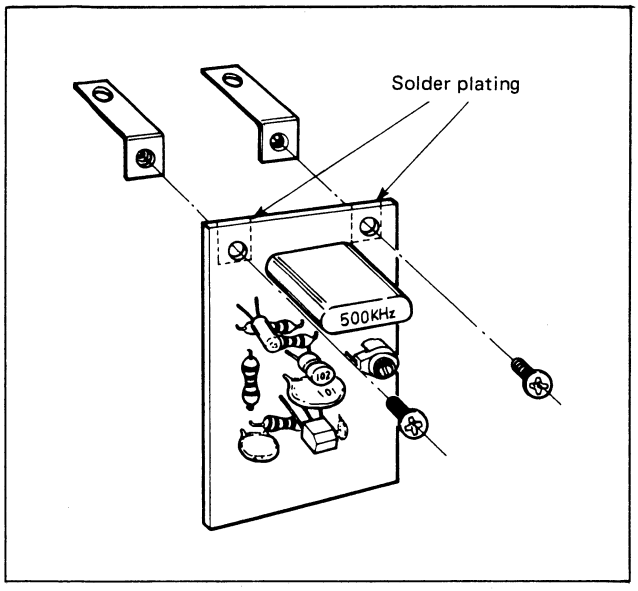


Fig. 17

Machining and mounting of wire materials

Mount the P.C.B. by using two blazer tap tight screws (3 x 6).

* Prepare a coaxial cable (190 mm).
* Strip the cable at both ends (20 mm from each end).
* Strip the cover of core by 5 mm after deviding it into an earthing wire and a core.
* Prepare two shrink tubes (15 mm).
* Put the shrink tubes on both ends of the coaxial cable and contract the tube with heat by using a soldering iron.

Eyelet MKO ★ → Core of shield wire → 3P terminal board 1 ★

Eyelet G ★ → Earthing wire of shield wire → 3P terminal 2 ★

* The eyelet should be inserted from parts' side of the P.C.B.

Eyelet 9MK ★ → Red/White single wire 240 mm → RF gain control volume terminal A ★

* When the FM option is installed, this wiring should be passed through the under portion of the shaft.

Switch unit P.C.B. eyelet 8 ★ → Orange single wire 110 → RF gain control volume terminal C ★

Adjustments

Set the OR-666 and receive a standard electric wave.

Although several standard electric waves such as 2.5, 5, 10, 15, 20 and 25 MHz may be available, the most strongest one must be selected.

Turn on the marker by pulling the shaft of RF gain control volume.

Obtain the so called "Zero beat" with respect to the standard electric wave by rotating the TC-1 on the marker P.C.B.

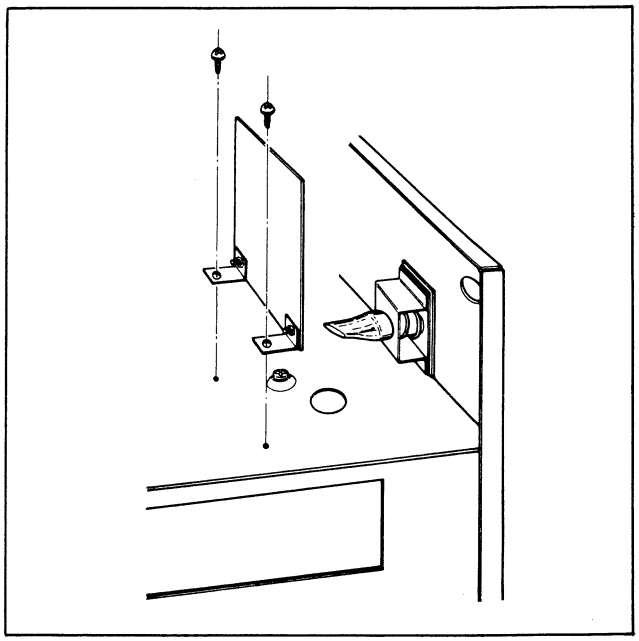


Fig. 18

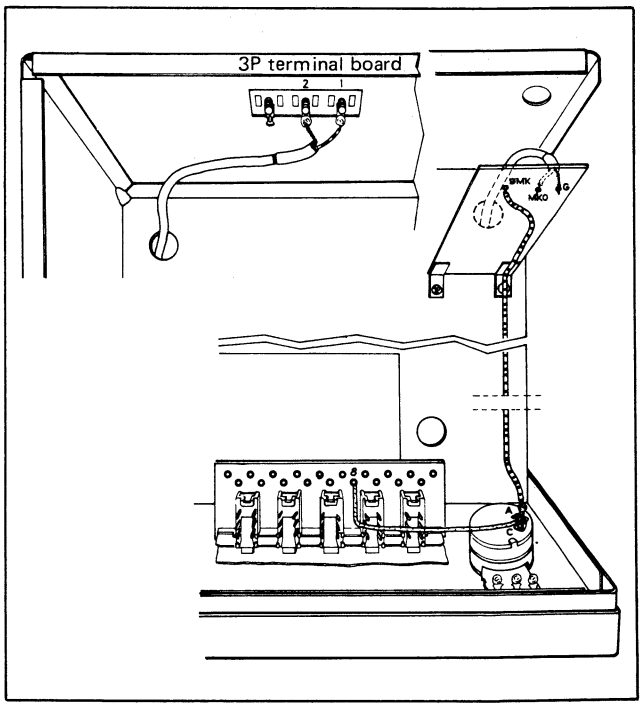
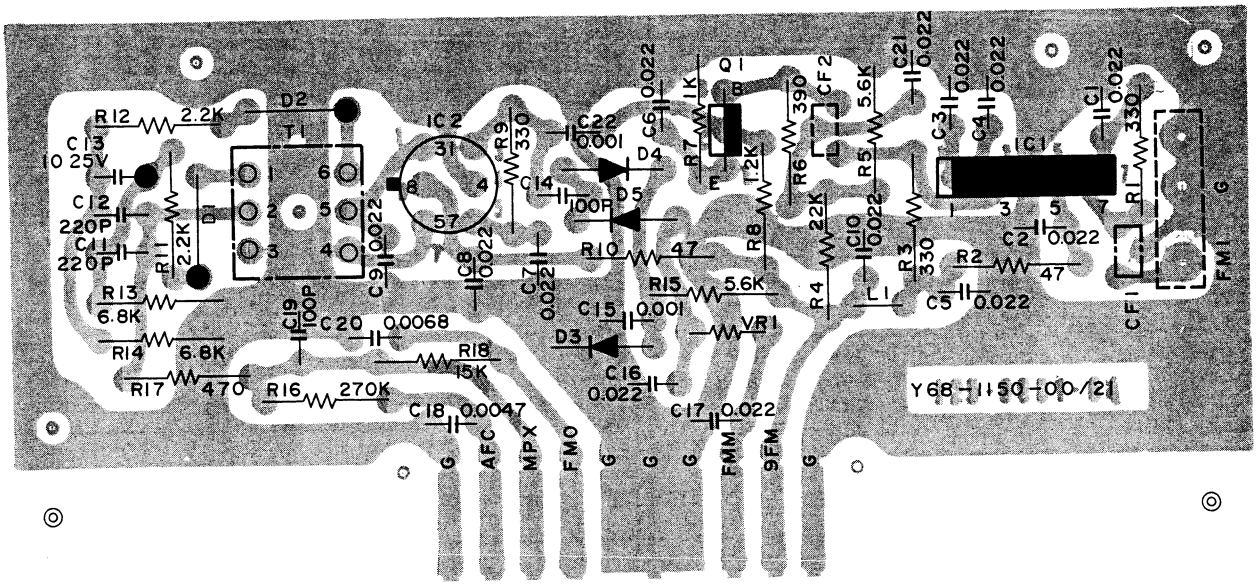


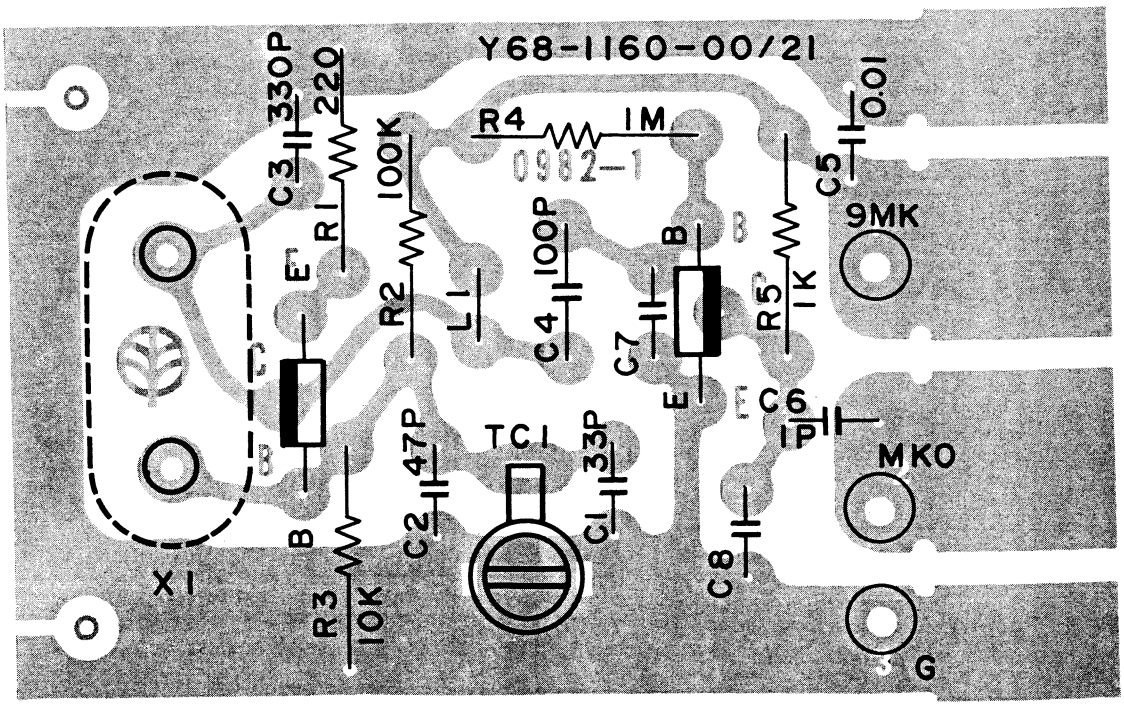
Fig. 19

PC BOARD

PC BOARD OF QR-6FM



PC BOARD OF QR-6MK



PARTS LIST

PARTS LIST OF QR-6FM

■ FM TUNER (Y68-1150-00)

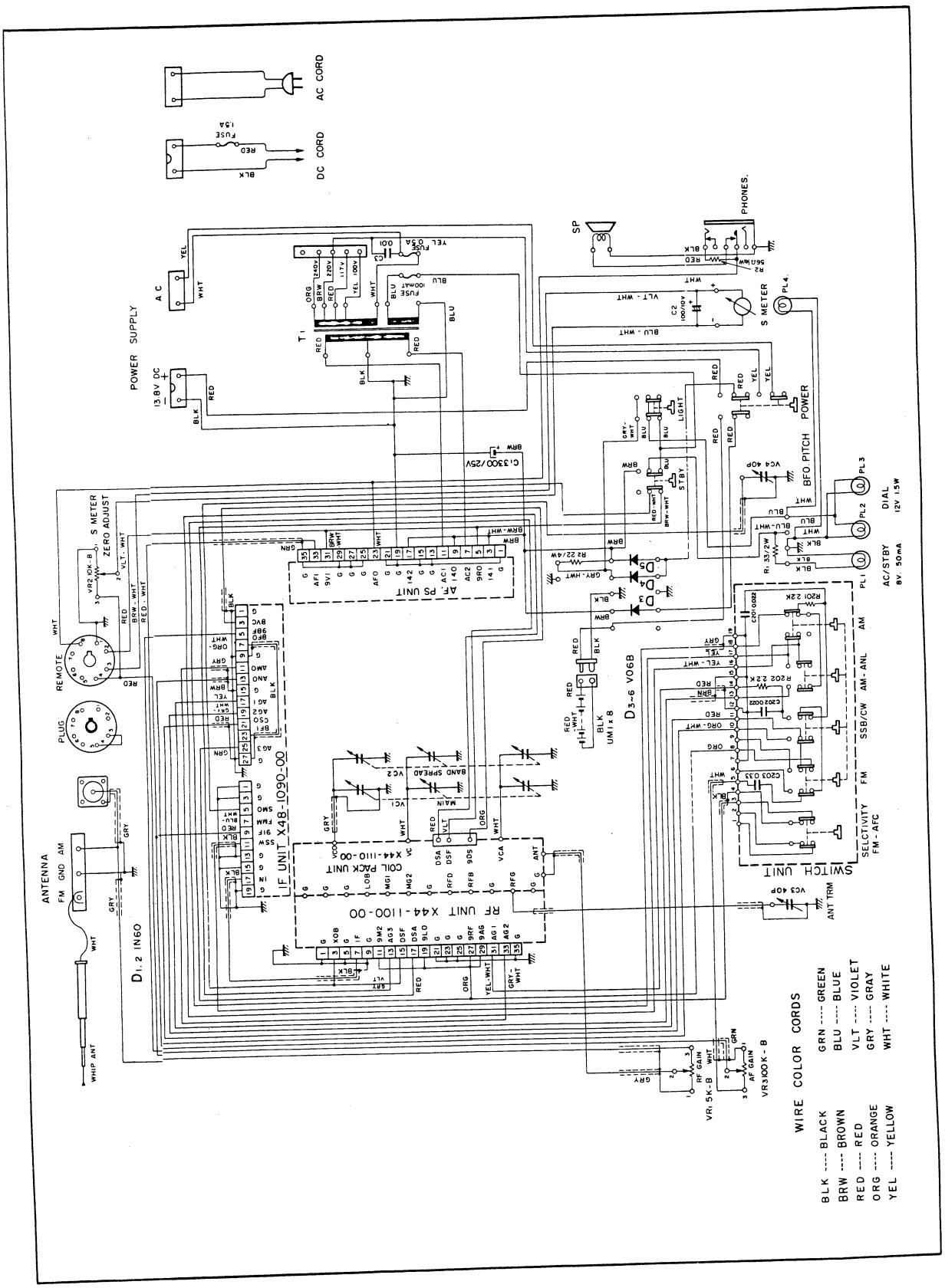
Ref. No.	Parts No.	Description	1 Remarks
		CAPACITOR	
–	CC45SL1H101K	Ceramic 100pF ±10%	
–	CC45SL1H221K	Ceramic 220pF ±10%	
–	CK45B1H102K	Ceramic 1000pF ±10%	
–	CK45D1H102M	Ceramic 1000pF ±20%	
–	CK45F1H223Z	Ceramic 0.022μF +80% −20%	
–	CE04W1E100	Electrolytic 10μF 25WV	
–	CQ92M1H223K-NS	Mylar 0.022μF ±10%	
–	CQ93M1H682J	Mylar 0.0668μF ±5%	
–	CQ93M1H472K	Mylar 0.0047μF ±10%	
–	CQ93M1H103K	Mylar 0.01μF ±10%	
		RESISTOR	
–	PD14BY2E470J	Carbon 47Ω ±5% 1/4W	
–	PD14BY2E331J	Carbon 330Ω ±5% 1/4W	
–	PD14BY2E391J	Carbon 390Ω ±5% 1/4W	
–	PD14BY2E471J	Carbon 470Ω ±5% 1/4W	
–	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
–	PD14BY2E122J	Carbon 1.2kΩ ±5% 1/4W	
–	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
–	PD14BY2E562J	Carbon 5.6kΩ ±5% 1/4W	
–	PD14BY2E682J	Carbon 6.8kΩ ±5% 1/4W	
–	PD14BY2E123J	Carbon 12kΩ ±5% 1/4W	
–	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W	
–	PD14BY2E223J	Carbon 22kΩ ±5% 1/4W	
–	PD14BY2E274J	Carbon 270kΩ ±5% 1/4W	
		SEMICONDUCTOR	
–		Transistor 2SC535 (B)	
–		I.C. TA7061AP	
–		I.C. μPC555A	
–		Diode 1N60	
–		Diode 1S1555	
		COIL	
T1	L30-0207-15	Discriminator coil	
L1	L33-0086-05	Ferri-inductor	
–	L60-0027-05	FM UNIT	
CF1,2	L72-0014-05	Ceramic filter	
		MISCELLANEOUS	
–	B08-3008-04	Ornamental window	
–	B09-0003-05	Joint	
–	D13-0028-04	Bevel gear	
–	D20-0081-33	Vernier shaft	
–	D21-0330-04	Shaft	
–	D23-0061-04	Bearing	
–	E09-0315-05	Ceonnector (3P)	
–	E10-1004-05	Socket (10P)	
–	E19-0302-05	Connector (3P)	
–	F19-0141-04	Back cover	
–	J21-1176-03	Tuner mounting hardware	
–	J32-0117-04	Hexagonal boss	
–	J61-0019-05	Cable wrapping band	
–	K20-0132-04	Tuning knob A	
–	K21-0273-04	Tuning knob B	

Ref. No.	Parts No.	Description	Remarks
–	N09-0156-04	Screw (speed nut)	
–	N14-0074-05	Speed nut	
–	N17-1030-31	Internal lock washer	
–	N35-3006-15	Bind screw	
–	N87-3006-41	Bracer tap tight screw	
–	N87-3010-41	Bracer tap tight screw	
–	001-0801-05	Plated wire	
–	011-6991-05	Lead wire	
–	011-6191-05	Lead wire	
–	053-1001-15	Shield wire	
–	053-1501-15	Shield wire	
–	061-1501-05	Coaxial cable	
–	212-0402-05	Insulated tube	

■ PARTS LIST OF QR-6MK

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
–	CC45SL1H010C	Ceramic 1pF ±0.25pF	
–	CC45CH1H330J	Ceramic 33pF ±5%	
–	CC45TH1H470J	Ceramic 47pF ±5%	
–	CC45CH1H101J	Ceramic 100pF ±5%	
–	CK45B1H102K	Ceramic 0.001μF ±10%	
–	CK45F1H103Z	Ceramic 0.01μF +80% −20%	
		RESISTOR	
–	PD14BY2E221J	Carbon 220Ω ±5% 1/4W	
–	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
–	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
–	PD14BY2E104J	Carbon 100kΩ ±5% 1/4W	
–	PD14BY2E105J	Carbon 1MΩ ±5% 1/4W	
		SEMICONDUCTOR	
–		Transistor 2SC460 (B)	
		MISCELLANEOUS	
–	J21-0047-04	Mounting hardware	
–	J25-0982-14	P.C. board	
–	L33-0104-05	Ferri-inductor	
–	L77-0364-05	Crystal oscillator	
–	011-629-05	Lead wire (Red, White)	
–	011-6331-05	Lead wire (Orange)	
–	060-3001-05	Coaxial cable 1.5D-XV	
–	212-0402-05	Insulated tube	
–	N35-3006-15	Bind screw	
–	N87-3006-41	Blazer tap tight screw	
Tc1	C05-0029-15	Ceramic trimmer	

SCHEMATIC DIAGRAM OF QR-666



SCHEMATIC DIAGRAM OF QR-666